14-47

No. _____

IN THE

Supreme Court of the United States

UTILITY AIR REGULATORY GROUP,
Petitioner,

v.

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY,
Respondent.

On Petition for a Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

APPENDIX VOLUME I OF II

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TABLE OF CONTENTS

Page

VOLUME I:

APPENDIX A: Order of the U.S. Court of Appeals for the District of Columbia Circuit Denying All Petitions for Review, Except the Petition for Review in No. 12-1174, and Dismissing That Petition 1a

APPENDIX B: Opinion of the U.S. Court of Appeals for the District of Columbia Circuit 3a

APPENDIX C: U.S. Environmental Protection Agency, National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units; Final Rule, 77 Fed. Reg. 9304 (Feb. 16, 2012) (excerpts) 105a

VOLUME II:

APPENDIX D: Federal Statutes
Clean Air Act § 112, 42 U.S.C. § 7412 (excerpts) 477a

APPENDIX E: EPA's Responses to Public Comments on EPA's National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units, Vol. 1 (Dec. 2011), Docket No. EPA-HQ-OAR-2009-0234-20126 (excerpts) 506a

APPENDIX F: Utility Air Regulatory Group, Comments on National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units: Proposed Rule (Aug. 4, 2011), Docket No. EPA-HQ-OAR-2009-0234-17775 (excerpts) 510a

APPENDIX G: U.S. Environmental Protection Agency, National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units; Proposed Rule, 76 Fed. Reg. 24,976 (May 3, 2011) (excerpts) 514a

APPENDIX H: U.S. Environmental Protection Agency, Revision of December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units and the Removal of Coal- and Oil-Fired Electric Utility Steam Generating Units From the Section 112(c) List; Final Rule, 70 Fed. Reg. 15,994 (Mar. 29, 2005) (excerpt) 544a

APPENDIX I: U.S. Environmental Protection Agency, Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units; Notice of Regulatory Finding, 65 Fed. Reg. 79,825 (Dec. 20, 2000) 610a

APPENDIX J: U.S. Environmental Protection Agency, EPA-453/R-98-004a, Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units -- Final Report to Congress, Vol. 1 (Feb. 1998), Docket No. EPA-HQ-OAR-2009-0234-3052 (excerpts) 636a

APPENDIX A

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 12-1100 **September Term, 2013**
FILED ON: APRIL 15, 2014

WHITE STALLION ENERGY CENTER, LLC,
PETITIONER

V.

ENVIRONMENTAL PROTECTION AGENCY,
RESPONDENT

AMERICAN ACADEMY OF PEDIATRICS, ET AL.,
INTERVENORS

Consolidated with 12-1101, 12-1102, 12-1147, 12-1172, 12-1173, 12-1174, 12-1175, 12-1176, 12-1177, 12-1178, 12-1180, 12-1181, 12-1182, 12-1183, 12-1184, 12-1185, 12-1186, 12-1187, 12-1188, 12-1189, 12-1190, 12-1191, 12-1192, 12-1193, 12-1194, 12-1195, 12-1196

On Petitions for Review of Final Rule of the
United States Environmental Protection Agency

BEFORE: Garland, *Chief Judge*, and Rogers and Kavanaugh, *Circuit Judges*

JUDGMENT

These causes came on to be heard on the petitions for review of a Final Rule of the United States Environmental Protection Agency and were argued by counsel. On consideration thereof, it is

ORDERED and **ADJUDGED** that the petitions for review be denied except that the petition for review in No. 12-1174, *Julander Energy Co. v. EPA*, be dismissed for lack of standing, in accordance with the opinion of the court filed herein this date.

Per Curiam

FOR THE COURT:
Mark J. Langer, Clerk

BY:

/s/
Jennifer M. Clark
Deputy Clerk

Date: April 15, 2014

Opinion Per Curiam.
Opinion concurring in part and dissenting in part filed by Circuit Judge Kavanaugh.

APPENDIX B

UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

Argued December 10, 2013
Decided April 15, 2014

No. 12-1100

WHITE STALLION ENERGY CENTER, LLC,
PETITIONER

v.

ENVIRONMENTAL PROTECTION AGENCY,
RESPONDENT

AMERICAN ACADEMY OF PEDIATRICS, ET AL.,
INTERVENORS

Consolidated with 12-1101, 12-1102, 12-1147, 12-1172, 12-1173, 12-1174, 12-1175, 12-1176, 12-1177, 12-1178, 12-1180, 12-1181, 12-1182, 12-1183, 12-1184, 12-1185, 12-1186, 12-1187, 12-1188, 12-1189, 12-1190, 12-1191, 12-1192, 12-1193, 12-1194, 12-1195, 12-1196

On Petitions for Review of Final Rule of the United States Environmental Protection Agency

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Lee B. Zeugin and *Neil D. Gordon*, Assistant Attorney General, Office of the Attorney General for the State of Michigan, argued the causes for State, In-

dustry, and Labor Petitioners. With them on the joint briefs were *F. William Brownell*, *Lauren E. Freeman*, *Elizabeth L. Horner*, *Bill Schuette*, Attorney General, Office of the Attorney General for the State of Michigan, *John J. Bursch*, Solicitor General, *S. Peter Manning*, Assistant Attorney General, *Luther Strange*, Attorney General, Office of the Attorney General for the State of Alabama, *Michael C. Geraghty*, Attorney General, Office of the Attorney General for the State of Alaska, *Steven E. Mulder*, Attorney, *Peter S. Glaser*, *George Y. Sugiyama*, *Michael H. Higgins*, *David B. Rifkin, Jr.*, *Lee A. Casey*, *Mark W. DeLaquil*, *Andrew M. Grossman*, *David Flannery*, *Gale Lea Rubrecht*, *Kathy G. Beckett*, *Edward L. Kropp*, *Leslie Sue Ritts*, *Thomas Horne*, Attorney General, Office of the Attorney General for the State of Arizona, *Joseph P. Mikitish* and *James T. Skardon*, Assistant Attorneys General, *Dustin McDaniel*, Attorney General, Office of the Attorney General for the State of Arkansas, *Kendra Akin Jones*, Assistant Attorney General, *Charles L. Moulton*, Senior Assistant Attorney General, *Pamela Jo Bondi*, Attorney General, Office of the Attorney General for the State of Florida, *Jonathan A. Glogau*, Attorney, *Lawrence G. Wasden*, Attorney General, Office of the Attorney General for the State of Idaho, *Grant Crandall*, *Arthur Traynor, III*, *Eugene M. Trisko*, *Gregory F. Zoeller*, Attorney General, Office of the Attorney General for the State of Indiana, *Valerie Tachtiris*, Deputy Attorney General, *Dennis Lane*, *Derek Schmidt*, Attorney General, Office of the Attorney General for the State of Kansas, *Jeffrey A. Chanay*, Deputy Attorney General, *Henry V. Nickel*, *George P. Sibley III*, *Eric A. Groten*, *Jeremy C. Marwell*, *John A. Riley*, *Christopher C. Thiele*, *Harold E. Pizzetta III*, Assistant Attorney General,

Office of the Attorney General for the State of Mississippi, *Chris Koster*, Attorney General, Office of the Attorney General for the State of Missouri, *James R. Layton* and *John J. McManus*, Attorneys, *Paul D. Clement*, *Nathan A. Sales*, *Lisa Marie Jaeger*, *Jon Bruning*, Attorney General, Office of the Attorney General for the State of Nebraska, *Katherine J. Spohn*, Special Counsel to the Attorney General, *Wayne Stenehjem*, Attorney General, Office of the Attorney General for the State of North Dakota, *Margaret I. Olson*, *Steven C. Kohl*, *Eugene E. Smary*, *Sarah C. Lindsey*, *E. Scott Pruitt*, Attorney General, Office of the Attorney General for the State of Oklahoma, *P. Clayton Eubanks*, Assistant Attorney General, *Michael DeWine*, Attorney General, Office of the Attorney General for the State of Ohio, *Dale T. Vitale* and *Gregg H. Bachmann*, Assistant Attorneys General, *Robert M. Wolff*, Special Counsel, *Alan Wilson*, Attorney General, Office of the Attorney General for the State of South Carolina, *James Emory Smith, Jr.*, Assistant Deputy Attorney General, *Mark L. Shurtleff*, Attorney General, Office of the Attorney General for the State of Utah, *Greg Abbott*, Attorney General, Office of the Attorney General for the State of Texas, *Jon Niermann*, Chief, *Mark Walters* and *Mary E. Smith*, Assistant Attorneys General, *Kenneth T. Cuccinelli, II*, Attorney General, Office of the Attorney General for the Commonwealth of Virginia, *Patrick Morrisey*, Attorney General, Office of the Attorney General for the State of West Virginia, *Silas B. Taylor*, Senior Deputy Attorney General, *Jeffrey R. Holmstead*, *Sandra Y. Snyder*, *Gregory A. Phillips*, Attorney General, Office of the Attorney General for the State of Wyoming, *Jay A. Jerde*, Deputy Attorney General, *Jack Conway*, Attorney General, Office of

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Bill Cobb argued the cause for Industry Petitioners' Specific Issues. With him on the briefs were Michael Nasi, Leslie Sue Ritts, Jeffrey R. Holmstead, Sandra Y. Snyder, Paul D. Clement, Nathan A. Sales, Steven C. Kohl, Eugene E. Smary, Sarah C. Lindsay, Bart E. Cassidy, Katherine L. Vaccaro, John C. Hayes, Jr., Dennis Lane, John A. Riley, Christopher C. Thiele, C. Grady Moore, III, P. Stephen Gidiere, III, and Thomas Lee Casey, III.

Sanjay Narayan and Eric Schaeffer argued the causes for Environmental Petitioners. With them on the briefs were Whitney Farrell, James S. Pew, Neil Gormley, Ann Brewster Weeks, and Darin Schroeder.

David Bookbinder argued the cause and filed the briefs for petitioner Julander Energy Company.

Michael B. Wigmore, *Sandra P. Franco*, *Robin S. Conrad*, *Rachel Brand*, and *Sheldon Gilbert* were on the brief for *amicus curiae* The Chamber of Commerce of the United States of America in support of Industry Petitioners.

Eric G. Hostetler, *Matthew R. Oakes*, and *Amanda S. Berman*, Attorneys, U.S. Department of Justice, argued the causes for respondent. With them on the brief was *Wendy L. Blake*, Attorney, U.S. Environmental Protection Agency.

Melissa Hoffer, Assistant Attorney General, Office of the Attorney General for the Commonwealth of Massachusetts, argued the cause for State and Local Government Intervenors in support of Respondent. With her on the brief were *Martha Coakley*, Attorney

General, Office of the Attorney General for the State of Massachusetts, *Tracy Triplett* and *Carol A. Iancu*, Assistant Attorneys General, *Kamala D. Harris*, Attorney General, Office of the Attorney General for the State of California, *Janill L. Richards*, Supervising Deputy Attorney General, *Susan L. Durbin*, Deputy Attorney General, *Joseph R. Biden, III*, Attorney General, Office of the Attorney General for the State of Delaware, *Valerie M. Satterfield*, Deputy Attorney General, *Thomas L. Miller*, Attorney General, Office of the Attorney General for the State of Iowa, *David R. Sheridan*, Assistant Attorney General, *George Jepsen*, Attorney General, Office of the Attorney General for the State of Connecticut, *Kimberly P. Massicotte* and *Matthew I. Levine*, Assistant Attorneys General, *Lisa Madigan*, Attorney General, Office of the Attorney General for the State of Illinois, *Matthew J. Dunn* and *Gerald T. Karr*, Assistant Attorneys General, *Douglas F. Gansler*, Attorney General, Office of the Attorney General for the State of Maryland, *Roberta R. James*, Assistant Attorney General, *Michael A. Delaney*, Attorney General, Office of the Attorney General for the State of New Hampshire, *K. Allen Brooks*, Senior Assistant Attorney General, *Janet T. Mills*, Attorney General, Office of the Attorney General for the State of Maine, *Gerald D. Reid*, Assistant Attorney General, *Lori Swanson*, Attorney General, Office of the Attorney General for the State of Minnesota, *Max Kieley*, Assistant Attorney General, *Eric T. Schneiderman*, Attorney General, Office of the Attorney General for the State of New York, *Michael J. Myers* and *Kevin P. Donovan*, Assistant Attorneys General, *Ellen F. Rosenbaum*, Attorney General, Office of the Attorney General for the State of Oregon, *Paul A. Garrahan*, As-

sistant Attorney-in-Charge, *Gary K. King*, Attorney General, Office of the Attorney General for the State of New Mexico, *Stephen R. Farris*, Assistant Attorney General, *Roy Cooper*, Attorney General, Office of the Attorney General for the State of North Carolina, *James C. Gulick*, Senior Deputy Attorney General, *J. Allen Jernigan*, *Marc Bernstein*, and *Amy L. Bircher*, Special Deputy Attorneys General, *William H. Sorrell*, Attorney General, Office of the Attorney General for the State of Vermont, *Thea J. Schwartz*, Assistant Attorney General, *George A. Nilson*, *William R. Phelan, Jr.*, *Peter F. Kilmartin*, Attorney General, Office of the Attorney General for the State of Rhode Island, *George S. Schultz*, Special Assistant Attorney General, *Irvin B. Nathan*, Attorney General, Office of the Attorney General for the District of Columbia, *Amy E. McDonnell*, Deputy General Counsel, *Christopher King*, *Benna Ruth Solomon*, and *Jeremy Toth*.

Sean H. Donahue argued the cause for Public Health, Environmental, and Environmental Justice Group Respondent Intervenors. With him on the brief were *Pamela A. Campos*, *Tomás Carbonell*, *Ann Brewster Weeks*, *Darin T. Schroeder*, *James S. Pew*, *Neil E. Gormley*, *Sanjay Narayan*, *John D. Walke*, and *John Suttles*. *Vickie L. Patton* entered an appearance.

Brendan K. Collins argued the cause for Industry Respondent Intervenors. With him on the brief were *Robert B. McKinstry Jr.*, *Lorene L. Boudreau*, and *Erik S. Jaffe*.

Peter S. Glaser, George Y. Sugiyama, F. William Brownell, Lauren E. Freeman, Lee B. Zeugin, Elizabeth L. Horner, David B. Rivkin Jr., Lee A. Casey, Mark W. DeLaquil, Andrew M. Grossman, Jeremy C.

Marwell, Eric A. Groton, Jeffrey R. Holmstead, and Sandra Y. Snyder were on the brief for Industry Intervenors in response to Environmental Petitioners. Henry V. Nickel entered an appearance.

Peter S. Glaser, George Y. Sugiyama, Hahnah Williams, F. William Brownell, Lauren E. Freeman, Lee B. Zeugin, Elizabeth L. Horner, Jeremy C. Marwell, Eric A. Groton, Jeffrey R. Holmstead, Sandra Y. Snyder, Bill Cobb, Michael Nasi, David B. Rivkin Jr., Lee A. Casey, Mark W. DeLaquil, and Andrew M. Grossman were on the brief for Intervenor Respondents in Opposition to Brief of Petitioner Julander Energy Company.

Wendy B. Jacobs, *Adam Babich*, and *Michael A. Livermore* were on the brief for *amici curiae* Institute for Policy Integrity, et al. in support of respondent.

Before: GARLAND, *Chief Judge*, and ROGERS and KAVANAUGH, *Circuit Judges*.

PER CURIAM:[1] In 2012, the Environmental Protection Agency promulgated emission standards for a number of listed hazardous air pollutants emitted by coal- and oil-fired electric utility steam generating units. *See National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial- Institutional, and Small Indus-*

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[1] Parts I, II, and IV are written by Judge Rogers. Part III is written by Judge Kavanaugh, as are his dissenting opinion in Part II.B.2 and his concurring opinion in Part IV.

trial-Commercial-Institutional Steam Generating Units, Final Rule, 77 Fed. Reg. 9304 (Feb. 16, 2012). In this complex case, we address the challenges to the Final Rule by State, Industry, and Labor petitioners, by Industry petitioners to specific aspects of the Final Rule, by Environmental petitioners, and by Julander Energy Company. For the following reasons, we deny the petitions challenging the Final Rule.

I.

In 1970, Congress enacted § 112 of the Clean Air Act, Pub. L. No. 91-604, § 4(a), 84 Stat. 1676, 1685 (1970), to reduce hazardous air pollutants ("HAPs"). *See Sierra Club v. EPA*, 353 F.3d 976, 979 (D.C. Cir. 2004); H. R. REP. NO. 101-490, at 150 (1990). The statute defined HAPs as "air pollutant[s] . . . which in the judgment of the Administrator [of the Environmental Protection Agency ("EPA")] cause, or contribute to, air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness." § 112(a)(1), 84 Stat. at 1685. In its original form, § 112 required EPA to publish a list containing "each hazardous air pollutant for which [it] intends to establish an emission standard." § 112(b)(1)(A), 84 Stat. at 1685. EPA then was to promulgate, within 360 days, emission standards "provid[ing] an ample margin of safety to protect the public health" for each listed HAP, unless EPA found that a particular listed substance was in fact not hazardous. § 112(b)(1)(B), 84 Stat. at 1685. Over the next eighteen years, EPA listed only eight HAPs, established standards for only seven, and as to these seven addressed only a limited selection of possible pollution sources. *See New Jersey v. EPA*, 517 F.3d

574, 578 (D.C. Cir. 2008); S. REP. NO. 101-228, at 131 (1989).

To remedy the slow pace of EPA's regulation of HAPs, Congress amended the Clean Air Act in 1990, *see* Pub. L. No. 101-549, 104 Stat. 2531 (1990) ("CAA"), by eliminating much of EPA's discretion in the process. *See New Jersey*, 517 F.3d at 578. In the amended § 112, Congress itself listed 189 HAPs that were to be regulated, *see* CAA § 112(b), 42 U.S.C. § 7412(b), and directed EPA to publish a list of "categories and subcategories" of "major sources" and certain "area sources" that emit these pollutants, CAA § 112(c), 42 U.S.C. § 7412(c). Once listed, a source category may only be delisted (with one exception not relevant here) if EPA determines that "no source" in that category emits HAPs in quantities exceeding specified thresholds. CAA § 112(c)(9)(B), 42 U.S.C. § 7412(c)(9)(B). For each listed "category or subcategory of major sources and area sources" of HAPs, EPA must promulgate emission standards. CAA § 112(d)(1), 42 U.S.C. § 7412(d)(1). Section 112(d) provides, as relevant, that emission standards

> shall require the *maximum degree of reduction in emissions* of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable[.]

CAA § 112(d)(2), 42 U.S.C. § 7412(d)(2) (emphasis added). For existing sources, these "maximum achievable control technology" ("MACT") standards

may not be less stringent —regardless of cost or other considerations — "than [] the average emission limitation achieved by the best performing [] sources" in the relevant category or subcategory. CAA § 112(d)(3)(A)–(B), 42 U.S.C. § 7412(d)(3)(A)–(B); *see Nat'l Lime Ass'n v. EPA*, 233 F.3d 625, 629 (D.C. Cir. 2000). EPA refers to minimum-stringency MACT standards as "floors." Standards more stringent than the floors, determined pursuant to § 112(d)(2), are called "beyond-the-floor" limits.

For electric utility steam generating units ("EGUs"), however, Congress directed that prior to any listing EPA conduct a study of "the *hazards to public health* reasonably anticipated to occur as a result of [EGU HAP emissions] after imposition of the requirements of this Chapter [i.e., Chapter 85 Air Pollution Prevention and Control]." CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A) (emphasis added). The results of this "Utility Study" were to be reported to Congress within three years. *Id.* Further, Congress directed that:

> The Administrator shall regulate [EGUs] under this section, if the Administrator finds such regulation is *appropriate and necessary* after considering the results of the study required by this subparagraph.

Id. (emphasis added). Congress also directed EPA to conduct two other studies on mercury emissions: the "Mercury Study" on "the rate and mass of such emissions, the health and environmental effects of such emissions, technologies which are available to control such emissions, and the costs of such technologies," to be reported to Congress in four years, and the National Institute of Environmental Health Sciences

"study to determine the threshold level of mercury exposure below which adverse human health effects are not expected to occur," to be reported to Congress in three years. See CAA § 112(n)(1)(A)–(C), 42 U.S.C. § 7412(n)(1)(A)–(C).

In December 2000, on the basis of the Utility Study and other data subsequently gathered, EPA issued a notice of regulatory finding "that regulation of HAP emissions from coaland oil-fired electric utility steam generating units under section 112 of the CAA is appropriate and necessary." *Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units*, 65 Fed. Reg. 79,825, 79,826 (Dec. 20, 2000) ("2000 Finding"). EPA found that EGUs "are the largest source of mercury emissions in the U.S." and that "[m]ercury is highly toxic, persistent, and bioaccumulates in food chains." 65 Fed. Reg. at 79,827. Specifically, "[m]ercury emitted from [EGUs] . . . is transported through the atmosphere and eventually deposits onto land or water bodies" where it then changes into "a highly toxic" substance called methylmercury. *Id.* Methylmercury "biomagnifies in the aquatic food chain," *id.*, meaning that it becomes concentrated in the bodies of predatory fish which absorb the methylmercury their food sources contained. When humans eat these contaminated fish, they also are exposed; the methylmercury from the fish is absorbed into the bloodstream and "distributed to all tissues including the brain." *Id.* at 79,829. The risks are greatest for women of childbearing age, EPA explained, because methylmercury "readily passes . . . to the fetus and fetal brain," *id.*, and "the developing fetus is most sensitive to the effects of methylmercury," *id.* at 79,827. Children born to

women who were exposed to methylmercury during pregnancy have exhibited neurological abnormalities and developmental delays. *Id.* at 79,829.

EPA concluded that "the available information indicate[d] that mercury emissions from [EGUs] . . . are a threat to public health and the environment," notwithstanding "uncertainties regarding the *extent* of the risks due to electric utility mercury emissions." *Id.* (emphasis added). EPA also identified several other metal and acid gas emissions from EGUs that were "of potential concern," namely arsenic, chromium, nickel, cadmium, dioxins, hydrogen chloride, and hydrogen fluoride. *Id.* EPA therefore determined that it was "appropriate" to regulate coal- and oil-fired EGUs under § 112 because of the health and environmental hazards posed by mercury emissions from EGUs, and the availability of a number of control options to effectively reduce such emissions. *Id.* at 79,830. EPA further determined that it was "necessary" to regulate EGUs under § 112 because implementation of other provisions of the CAA would "not adequately address" the public health and environmental hazards found. *Id.* Therefore, EPA added "coal- and oil-fired electric utility steam generating units to the list of source categories under section 112(c) of the CAA." *Id.*

In 2005, EPA reversed its 2000 Finding and removed coal- and oil-fired EGUs from the list of source categories under § 112(c). See Revision of December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units and the Removal of Coal- and Oil-Fired Electric Utility Steam Generating Units From the Section 112(c) List, 70 Fed. Reg. 15,994, 15,994

(Mar. 29, 2005) ("2005 Delisting Decision"). This change was based on EPA's revised interpretation of § 112(n)(1)(A) and, to some extent, on a revised assessment of the results of the Utility Study. EPA concluded that it lacked authority under § 112(n)(1)(A) to regulate on the basis of non-health hazards (e.g., environmental harms), and should "focus solely" on the health effects directly attributable to EGU emissions, rather than on EGUs' contribution to overall pollutant levels. Id. at 15,998. Further, EPA decided it could consider other relevant, "situation-specific factors, including cost" that may affect whether regulation under § 112 is "appropriate." Id. at 16,000–01. Critically, EPA determined that it must make its "appropriate and necessary" finding by reference to health hazards that will remain "after imposition of the requirements of" the CAA. Id. at 15,998 (emphasis added) (quoting CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A)). EPA interpreted these other "requirements" to include "not only those requirements already imposed and in effect, but also those requirements that EPA reasonably anticipates will be implemented" and which "could either directly or indirectly result in reductions of utility HAP emissions." Id. at 15,999. Concluding that regulation under other provisions of the CAA would adequately address EGU emissions of mercury and other HAPs, EPA determined that regulation under § 112 was neither "appropriate" nor "necessary." Id. at 16,002–08. In responding to comments, EPA stated that if it were to regulate EGU emissions, then it would regulate only those substances for which it had made a specific "appropriate and necessary" determination. States and other groups petitioned for review and this court vacated the 2005 Listing Decision, New

Jersey, 517 F.3d at 583, holding that EPA's attempt to reverse its December 2000 listing decision was unlawful because Congress had "unambiguously limit[ed] EPA's discretion to remove sources, including EGUs, from the section 112(c)(1) list once they have been added to it."

In 2012, after notice and comment, EPA "confirm[ed]" its 2000 Finding that regulation of EGU emissions under § 112 is "appropriate and necessary." Final Rule, 77 Fed. Reg. 9304, 9310–11. In the proposed rule, EPA stated that "the December 2000 Finding was valid at the time it was made based on the information available to the Agency at that time." Proposed Rule, 76 Fed. Reg. 24,976, 24,986, 24,994–97 (May 3, 2011) ("NPRM"). Although of the view that no further evidence was required to affirm the 2000 Finding, EPA had conducted additional quantitative and qualitative analyses "confirm[ing] that it remains appropriate and necessary today to regulate EGUs under CAA section 112." *Id.* at 24,986; *see id.* at 24,999–25,020. With respect to the term "appropriate," EPA explained that it was "chang[ing] the position taken in 2005 that the appropriate finding could not be based on environmental effects alone"; "revisiting the 2005 interpretation that required the Agency to consider HAP emissions from EGUs without considering the cumulative impacts of all sources of HAP emissions"; "revising the 2005 interpretation that required the Agency to evaluate the hazards to public health after imposition of the requirements of the CAA"; and "rejecting the 2005 interpretation that authorizes the Agency to consider other factors (*e.g.*, cost), even if the agency determines that HAP emitted by EGUs pose a hazard to public health (or the environment)." *Id.* at 24,989. With respect to the

term "necessary," EPA rejected as "unreasonable" its interpretation in 2005 that regulation under § 112 was "necessary" only if *no* other provision in the CAA — whether implemented or only anticipated — could "directly or indirectly" reduce HAP emissions to acceptable levels. *Id.* at 24,992.

EPA explained that it interpreted § 112(n)(1)(A)

> to require the Agency to find it *appropriate* to regulate EGUs under CAA section 112 if the Agency determines that the emissions of one or more HAP emitted from EGUs pose an identified or potential hazard to public health or the environment at the time the finding is made. If the Agency finds that it is *appropriate* to regulate, it must find it *necessary* to regulate EGUs under section 112 if the identified or potential hazards to public health or the environment will not be adequately addressed by the imposition of the requirements of the CAA. Moreover, it may be *necessary* to regulate utilities under section 112 for a number of other reasons, including, for example, that section 112 standards will assure permanent reductions in EGU HAP emissions, which cannot be assured based on other requirements of the CAA.

Id. at 24,987–88. EPA also affirmed that coal- and oil-fired EGUs were properly listed as a source category under § 112(c). *See id.* at 24,986. EPA adhered to these interpretations in the Final Rule, 77 Fed. Reg. at 9311. Accordingly, on February 16, 2012, EPA promulgated emission standards for a number of listed HAPs emitted by coal- and oil-fired EGUs. *See id.* at 9487–93.

Several petitions for review challenge the Final Rule. We first address, in Part II, the challenges of the State, Industry, and Labor petitioners. In Part III, we address Industry petitioners' specific issues. In Part IV.A, we address the challenges by the Environmental petitioners, and in Part IV.B, Julander Energy Company's standing. In addressing the substantive challenges to the Final Rule, this court must determine under the CAA whether the Final Rule was promulgated in a manner that was arbitrary or capricious, an abuse of discretion, or otherwise not in accordance with law. *See* CAA § 307(d)(9)(A), 42 U.S.C. § 7607(d)(9)(A). "The 'arbitrary and capricious' standard deems the agency action presumptively valid provided the action meets a minimum rationality standard." *Sierra Club*, 353 F.3d at 978–79 (quoting *Natural Res. Def. Council v. EPA*, 194 F.3d 130, 136 (D.C. Cir. 1999)). That is, "[i]f EPA acted within its delegated statutory authority, considered all of the relevant factors, and demonstrated a reasonable connection between the facts on the record and its decision, we will uphold its determination." *Ethyl Corp. v. EPA*, 51 F.3d 1053, 1064 (D.C. Cir. 1995). The court will show particular deference "where the agency's decision rests on an evaluation of complex scientific data within the agency's technical expertise." *Troy Corp. v. Browner*, 120 F.3d 277, 283 (D.C. Cir. 1997); *see also Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 377 (1989).

II.

State, Industry, and Labor petitioners challenge EPA's interpretation and application of the "appropriate and necessary" requirement in § 112(n)(1)(A).

A.

As a threshold matter, petitioners contend that the 2000 Finding was unlawful because EPA did not allow notice and comment on the finding, did not quantify the relevant mercury emissions and associated health risks, and did not describe "alternative control strategies" as required under § 112(n)(1)(A). Because the December 2000 notice was "fundamentally flawed," they contend it "could have no legal consequences" and "could not provide the basis for a § 112(c) listing decision." State, Industry & Labor Pet'rs' Br. (hereinafter "SIL Br.") 27–28. Without a proper listing under § 112(c), they contend, EPA has no authority to regulate EGUs under § 112(d).

The court need not decide whether EPA's December 2000 "appropriate and necessary" finding was procedurally or substantively valid because EPA reconsidered and "confirm[ed]" that determination in the Final Rule. *See* NPRM, 76 Fed. Reg. at 24,977; Final Rule, 77 Fed. Reg. at 9310–11, 9320. For the reasons we will discuss, we hold that EPA's finding in the Final Rule was substantively and procedurally valid, and consequently any purported defects in the 2000 Finding have been cured, rendering petitioners' challenge to December 2000 "appropriate and necessary" finding moot. *Cf. Fund for Animals, Inc. v. Hogan*, 428 F.3d 1059, 1063–64 (D.C. Cir. 2005).

B.

The crux of petitioners' challenge to the Final Rule focuses on EPA's interpretation of the phrase "appropriate and necessary" in § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A). The context of this phrase is as follows. In a special subsection on EGUs, Congress

first directed: "The Administrator shall perform a *study of the hazards to public health* reasonably anticipated to occur as a result of emissions by electric utility steam generating units of pollutants listed under subsection (f) after imposition of the requirements of this Act." CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A) (emphasis added). Congress then directed: "The Administrator shall regulate electric utility steam generating units under this section, if the Administrator finds such regulation is *appropriate and necessary after considering the results of the study* required by this subparagraph." *Id.* (emphasis added). Apart from the instruction to "consider[] the results of the [Utility Study]" on public health hazards from EGU emissions, the statute offers no express guidance regarding what factors EPA is required or permitted to consider in deciding whether regulation under § 112 is "appropriate and necessary." Neither does it define the words "appropriate" or "necessary." *See* NPRM, 76 Fed. Reg. at 24,986; 2005 Listing Decision, 70 Fed. Reg. at 15,997. Petitioners object to how EPA chose to fill these gaps.

In matters of statutory interpretation, the court applies the familiar two part test under *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 842–43 (1984). First, the court employs traditional tools of statutory construction to determine *de novo* "whether Congress has directly spoken to the precise question at issue." *Id.* at 842, 843 n.9. If the court "ascertains that Congress had an intention on the precise question at issue," *id.* at 843 n.9, "that is the end of the matter" and the court "must give effect to the unambiguously expressed intent of Congress," *id.* at 842–43. If, however, "the statute is silent or ambiguous with respect to the

specific issue," the court will uphold the agency's interpretation so long as it constitutes "a permissible construction of the statute." *Id.* at 843. "In such case, a court may not substitute its own construction of a statutory provision for a reasonable interpretation made by the administrator of an agency." *Id.* at 844.

To the extent petitioners' challenge concerns EPA's *change* in interpretation from that in 2005, our approach is the same because "[a]gency inconsistency is not a basis for declining to analyze the agency's interpretation under the *Chevron* framework." *Nat'l Cable & Telecomms. Ass'n v. Brand X Internet Servs.*, 545 U.S. 967, 981 (2005). That is, "if the agency adequately explains the reasons for a reversal of policy, change is not invalidating, since the whole point of *Chevron* is to leave the discretion provided by the ambiguities of a statute with the implementing agency." *Id.* (internal quotation marks omitted). And while "[u]nexplained inconsistency" may be "a reason for holding an interpretation to be an arbitrary and capricious change from agency practice," *id.*, our review of a change in agency policy is no stricter than our review of an initial agency action, *see FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 514–16 (2009). Thus, although an agency may not "depart from a prior policy *sub silentio* or simply disregard rules that are still on the books," the agency "need not demonstrate to a court's satisfaction that the reasons for the new policy are *better* than the reasons for the old one." *Id.* at 515. Rather, "it suffices that the new policy is permissible under the statute, that there are good reasons for it, and that the agency *believes* it to be better." *Id.*

1. *Reliance on delisting criteria.* In the Final Rule, EPA concluded that it is "appropriate and necessary" to regulate HAP emissions on the basis, *inter alia*, that EGU emissions of certain HAPs pose a cancer risk higher than the standard set forth in the § 112(c)(9) delisting criteria (i.e., greater than one in a million for the most exposed individual). *See* Final Rule, 77 Fed. Reg. at 9311; NPRM, 76 Fed. Reg. at 24,998. Petitioners contend that by so doing EPA wrongly conflated the delisting criteria with the "appropriate and necessary" determination. "By applying the *delisting* provisions of § 112(c)(9) in making the initial, *pre-listing* determination whether it is 'appropriate and necessary' to regulate EGUs, EPA has unlawfully imposed requirements on itself the Congress chose not to impose at the listing stage." SIL Br. 35. They maintain that EPA's approach "would treat EGUs the same as all other major source categories—as a category that *must* be listed *unless* the delisting criteria are met." *Id.*

EPA explained that it was relying upon the delisting criteria to interpret an ambiguous term in § 112(n)(1)(A), namely, "hazards to public health," *see* Final Rule, 77 Fed. Reg. at 9333–34; NPRM, 76 Fed. Reg. at 24,992–93, because the phrase "hazards to public health" is nowhere defined in the CAA. EPA looked to the delisting criteria, which specify the risk thresholds below which a source category need not be regulated, as evidence of congressional judgment as to what *degree* of risk constitutes a health hazard. *See id.* EPA explained:

> Although Congress provided no definition of *hazard to public health*, section 112(c)(9)(B) is instructive. In that section, Congress set forth

> a test for removing source categories from the section 112(c) source category list. That test is relevant because it reflects Congress' view as to the level of health effects associated with HAP emissions that Congress thought warranted continued regulation under section 112.

NPRM, 76 Fed. Reg. at 24,993 (emphasis added); *see* Final Rule, 77 Fed. Reg. at 9333–34. EPA concluded that it had discretion also to consider various other factors in evaluating hazards to public health, including

> the nature and severity of the health effects associated with exposure to HAP emissions; the degree of confidence in our knowledge of those health effects; the size and characteristics of the populations affected by exposures to HAP emissions; [and] the magnitude and breadth of the exposures and risks posed by HAP emissions from a particular source category, including how those exposures contribute to risk in populations with additional exposures to HAP from other sources[.]

NPRM, 76 Fed. Reg. at 24,992; *see* Final Rule, 77 Fed. Reg. at 9334.

EPA reasonably relied on the § 112(c)(9) delisting criteria to inform its interpretation of the undefined statutory term "hazard to public health." Congress did not specify what types or levels of public health risks should be deemed a "hazard" for purposes of § 112(n)(1)(A). By leaving this gap in the statute, Congress delegated to EPA the authority to give reasonable meaning to the term. *Cf. Chevron*, 467 U.S. at 843–44. EPA's approach does not, as petitioners

contend, "treat EGUs the same as all other major source categories." SIL Br. 35. Other major source categories *must* be listed unless the delisting criteria are satisfied; EPA's approach treats EGUs quite differently. For EGUs, EPA reasonably determined that it may look at a broad range of factors — only one of which concerned the § 112(c)(9) benchmark levels — in assessing the health hazards posed by EGU HAPs. Nowhere does EPA state or imply that the delisting criteria provide the sole basis for determining whether it is "appropriate and necessary" to regulate EGUs under § 112. Because EPA's approach is based on a permissible construction of § 112(n)(1)(A), it is entitled to deference and must be upheld.

2. *Costs of regulation.* Noting that in 2005 EPA construed § 112(n)(1)(A) to allow consideration of costs in determining whether regulation of EGU HAP emissions is "appropriate," petitioners contend that EPA's new interpretation to "preclude consideration of costs," SIL Br. 42, "unreasonably constrains the language of § 112(n)(1)(A)," SIL Br. 39. They point to the dictionary definition of "appropriate" and to the differences between regulation of EGUs under § 112(n)(1)(A) and regulating other sources under § 112(c), and to this court's precedent that "only where there is 'clear congressional intent to preclude consideration of cost' [do] we find agencies barred from considering costs." SIL Br. 40 (quoting *Michigan v. EPA*, 213 F.3d 663, 678 (D.C. Cir. 2000), *cert. denied*, 532 U.S. 904 (2001)). They contend that EPA's new interpretation "is also unlawful because it eliminates the discretion that Congress intended EPA to exercise after completing the Utility Study." SIL Br. 41. As they see it, if the statutory term "appropriate" imposes any limit whatsoever, it must at least limit

regulation to "risks [that] are worth the cost of elimination." SIL Reply Br. 14 (quoting *Michigan v. EPA*, 213 F.3d at 667 (addressing the term "significant")).

In the Final Rule, EPA stated that "it is reasonable to make the listing decision, including the appropriate determination, without considering costs." Final Rule, 77 Fed. Reg. at 9327. EPA reasoned that § 112(n)(1)(A) would have included an "express statutory requirement that the Agency consider costs in making the appropriate determination" if Congress wanted to require EPA to do so. *Id.* EPA also noted that "[t]o the extent [its] interpretation differs from the one set forth in 2005," it had "fully explained the basis for such changes." *Id.* at 9323 (citing NPRM, 76 Fed. Reg. at 24,986–93). (Even in 2005, EPA noted only that "[n]othing precludes EPA from considering costs in assessing whether regulation of [EGUs] under section 112 is appropriate in light of all the facts and circumstances presented." 2005 Delisting Decision, 70 Fed. Reg. at 16,001 n.19.) In responding to comments reacting to its position that "the better reading of the term 'appropriate' is that it does not allow for the consideration of costs in assessing whether hazards to public health or the environment are reasonably anticipated to occur based on EGU emissions," NPRM, 76 Fed. Reg. at 24,989, EPA observed that the dictionary definition of "appropriate" does not require consideration of costs and that commenters had failed to identify an express statutory requirement to that effect. EPA also stated that it was reasonable to decline to consider costs in the absence of an express statutory requirement to do so because Congress, in enacting § 112, was principally concerned with mitigating hazards to public health and the environment from HAP emissions. *See* Final

Rule, 77 Fed. Reg. at 9327. Inasmuch as Congress had treated the regulation of HAP emissions differently in the 1990 Amendments because EPA was not acting quickly enough, EPA concluded it was reasonable to make a listing decision without considering costs. *See id.*

On its face, § 112(n)(1)(A) neither requires EPA to consider costs nor prohibits EPA from doing so. Indeed, the word "costs" appears nowhere in subparagraph A. In the absence of any express statutory instruction regarding costs, petitioners rely on the dictionary definition of "appropriate" — meaning "especially suitable or compatible" or "suitable or proper in the circumstances" — to argue that EPA was required "to take into account costs to the nation's electricity generators when deciding whether to regulate EGUs." SIL Br. 39 (citing MERRIAM-WEBSTER'S ONLINE DICTIONARY; NEW OXFORD AMERICAN DICTIONARY (2d ed. 2005)). Yet these definitions, which do not mention costs, merely underscore that the term "appropriate" is "open-ended," "ambiguous," and "inherently context-dependent." *Sossamon v. Texas*, 131 S. Ct. 1651, 1659 (2011); *cf. Nat'l Ass'n of Clean Air Agencies v. EPA*, 489 F.3d 1221, 1229 (D.C. Cir. 2007).

Even if the word "appropriate" might require cost consideration in *some* contexts, such a reading of "appropriate" is unwarranted here, where Congress directed EPA's attention to the conclusions of the study regarding public health hazards from EGU emissions. Throughout § 112, Congress mentioned costs explicitly where it intended EPA to consider them. *Cf.* CAA § 112(d)(2), 112(d)(8)(A)(i), 112(f)(1)(B), 112(f)(2)(A), 112(n)(1)(B), 112(s)(2), 42

U.S.C. § 7412(d)(2), 7412(d)(8)(A)(i), 7412(f)(1)(B), 7412(f)(2)(A), 7412(n)(1)(B), 7412(s)(2). Indeed, in the immediately following subparagraph of § 112(n), Congress expressly required costs to be considered. CAA § 112(n)(1)(B), 42 U.S.C. § 7412(n)(1)(B). The contrast with subparagraph A could not be more stark. "Where Congress includes particular language in one section of a statute but omits it in another section of the same Act, it is generally presumed that Congress acts intentionally . . . in the disparate inclusion or exclusion." *Russello v. United States*, 464 U.S. 16, 23 (1983) (alterations omitted); *cf. Catawba Cnty., N.C. v. EPA*, 571 F.3d 20, 36 (D.C. Cir. 2009). Petitioners offer no compelling reason why Congress, by using only the broad term "appropriate," would have intended the same result — that costs be considered— in § 112(n)(1)(A). The legislative history the dissent claims "establishes" the point, Dissent at 13, consists of a Floor statement by a single Congressman that at best is ambiguous.[2] For these reasons, we conclude that the statute does not evince unambiguous congressional intent on the specific issue of whether EPA was required to consider costs in mak-

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[2] *See* 1 A LEGISLATIVE HISTORY OF THE CLEAN AIR ACT AMENDMENTS OF 1990, at 1416–17 (1993) (statement by Rep. Oxley) (indicating that the provision authorizing regulation of EGUs would "avoid[] the imposition of excessive and unnecessary costs" *by ensuring that* EPA can regulate "only if the studies described in section 112(n) clearly establish that emissions . . . from such units cause a significant risk of serious adverse effects on public health").

ing its "appropriate and necessary" determination under § 112(n)(1)(A).

Turning to EPA's approach, its position that "nothing about the definition of ['appropriate'] compels a consideration of costs," Final Rule, 77 Fed. Reg. at 9327, is clearly permissible. In *Whitman v. American Trucking Ass'ns*, 531 U.S. 457 (2001), Justice Scalia, writing for a unanimous Court, noted that the Supreme Court has "refused to find implicit in ambiguous sections of the CAA an authorization to consider costs that has elsewhere, and so often, been expressly granted." *Id.* at 467; *see also Natural Res. Def. Council v. U.S. EPA*, 824 F.2d 1146, 1163–65 (D.C. Cir. 1987) (en banc). EPA's interpretation is consistent with that instruction. Just as in *Whitman*, EPA declines to find in an ambiguous section what in so many other CAA sections Congress has mentioned expressly. And even assuming *Whitman* might be distinguished on grounds it concerned a different provision of the CAA, the question remains only whether EPA's interpretation is *permissible*. Petitioners cannot point to a single case in which this court has *required* EPA to consider costs where the CAA does not expressly so instruct. In *Michigan v. EPA*, this court merely held that "the agency was *free* to consider . . . costs" under CAA § 110(a)(2)(D), 42 U.S.C. § 7410(a)(2)(D), as EPA had urged in that case. 213 F.3d at 679 (emphasis added).

EPA's interpretation is also consistent with the purpose of the 1990 Amendments, which were aimed at remedying "the slow pace of EPA's regulation of HAPs" following the initial passage of the CAA. *New Jersey*, 517 F.3d at 578. To ensure that HAP emissions would be reduced to at least minimallyaccepta-

ble levels, Congress, among other things, listed 189 HAP substances for regulation and "restrict[ed] the opportunities for EPA and others to intervene in the regulation of HAP sources." *Id.* The overall purpose of the 1990 Amendments was to spur EPA to action. Although Congress gave EGUs a three-year pass when it instructed EPA to conduct a further study before regulating EGUs, *see* CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A), there is no indication that Congress did *not* intend EPA to regulate EGUs if and when their public health hazards were confirmed by the study, as they were here.

Petitioners, and our dissenting colleague, suggest that EPA's interpretation is unreasonable because the notion that Congress would have authorized EPA to regulate without *any* consideration of regulatory costs is implausible. But this argument rests on a false premise. Here, as in *Whitman*, interpreting one isolated provision not to require cost consideration does not indicate that Congress was unconcerned with costs altogether, because Congress accounted for costs elsewhere in the statute. Section 112(d)(2) expressly requires EPA to "tak[e] into consideration the cost of achieving . . . emission reduction[s]" when setting the *level* of regulation under § 112. CAA § 112(d)(2), 42 U.S.C. § 7412(d)(2). It is true that this cost consideration requirement does not apply with respect to MACT floors. Yet even for MACT floors, costs are reflected to some extent because the floors correspond (by definition) to standards that better-performing EGUs have *already achieved*, presumably in a cost efficient manner. *See* CAA § 112(d)(3)(A), 42 U.S.C. § 7412(d)(3)(A). Moreover, Industry respondent intervenors point out that petitioners' proposed approach would lead to an improbable "all-or-

nothing" scheme in which EPA could "choose not to regulate EGUs *at all* under Section 112 based on cost, even though EPA could not consider cost to justify a less stringent emission standard than the MACT floor." Indus. Resp't Intvn'rs' Br. 8.

Contrary to petitioners' claims, the word "appropriate" is not rendered meaningless unless interpreted to include cost consideration. Petitioners contend that § 112(n)(1)(A) mandates a two-step inquiry: EPA must "*first* identify 'a health hazard' from HAPs emitted from EGUs, and *then* determine whether regulation of that health hazard is 'appropriate and necessary.'" SIL Br. 41 (emphasis added). If the existence of a health hazard automatically *means* regulation is appropriate, they contend, then EPA has unlawfully abdicated the exercise of discretion Congress delegated to it. This argument, too, is unpersuasive. First, the rulemaking record reflects that EPA did *not* focus exclusively on health hazards in considering whether regulation would be "appropriate"; EPA also considered "the availability of controls to address HAP emissions from EGUs." NPRM, 76 Fed. Reg. at 24,989; *see id.* at 24,997; *see also* Final Rule, 77 Fed. Reg. at 9311. The factual premise of petitioners' argument is therefore incorrect. Second, even if EPA *had* focused exclusively on health hazards, the word "appropriate" would still have meaning in § 112(n)(1)(A) because the provision does not assume, as petitioners seem to suggest, that EPA would in fact "identify 'a health hazard'" from EGUs. SIL Br. 41. Rather, the statute directs EPA to "*perform a study* of the hazards to public health *reasonably anticipated* to occur" and then to "regulate [EGUs] . . . if the Administrator finds such regulation is appropriate and necessary after *considering the results of the*

study." CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A) (emphasis added). At the time Congress enacted the 1990 Amendments, it was possible that the Utility Study would fail to identify significant health hazards from EGU HAP emissions. (Indeed, petitioners argue that it *did* fail to do so. *See* SIL Br. 13, 48–54.) Therefore, EPA had to "consider[] the results of the study" in order to determine whether regulation would be "appropriate" based on its assessment of the existence and severity of such health hazards. The term "appropriate" plainly plays a role: it requires EPA to apply its judgment in evaluating the results of the study.

Basically, petitioners and our dissenting colleague seek to impose a requirement that Congress did not. What they ignore is that Congress sought, as a threshold matter, to have EPA confirm the nature of public health hazards from EGU emissions. That is the clear focus of § 112(n)(1)(A). After that, Congress left it to the expertise and judgment of EPA whether or not to regulate. For EPA to focus its "appropriate and necessary" determination on factors relating to public health hazards, and not industry's objections that emission controls are costly, properly puts the horse before the cart, and not the other way around as petitioners and our dissenting colleague urge. Given Congress's efforts in the 1990 Amendments to promote regulation of hazardous pollutants, EPA's interpretation of § 112(n)(1)(A) appears consistent with Congress's intent. Recall that only EGUs' hazardous emissions were relieved of regulation until completion of a study, and once the study confirmed the serious public health effects of hazardous pollutants from EGUs, Congress gave no signal that the matter should end if remediation would be costly.

Our dissenting colleague has written a powerful-sounding dissent. It sounds powerful, however, only because it elides the distinction between EPA's initial decision regarding whether to list EGUs as sources of hazardous air pollutants, and its subsequent decision regarding whether to issue stringent beyond-the-floor standards for such sources. The dissent refers to both together as the MACT "program." Dissent at 3. But the "program" in fact proceeds in two stages, as the dissent acknowledges. It is only as to the first, listing stage that EPA has determined it should not consider costs. That stage leads only to the setting of the statutory MACT floor which, as the dissent notes, is a "minimum stringency level." *Id.* The second stage leads to beyond-the-floor standards, which are more restrictive. When setting those, EPA *does* consider costs.

The dissent contends that "[m]eeting that [MACT] floor will be prohibitively expensive, particularly for many coal-fired utilities," forcing them "out of business." Dissent at 10–11. But in the Final Rule EPA rejected this contention, concluding that "the estimated number of early retirements," of EGUs "that may result from this rule is . . . less than 2 percent of all U.S. coalfired capacity" in 2015. Final Rule, 77 Fed. Reg. at 9416; *see also id.* at 9408 (rejecting the claim that the Final Rule "will result in substantial power plant retirements"). Petitioners have not challenged that conclusion. Industry respondent intervenors further observe that continuing to exempt EGUs from HAP regulation penalizes those plants that *have* made investments in clean air technology, and that "[t]he Rule merely requires owners of uncontrolled plants to install and operate control technology already operating at their competitors' plants, both lev-

eling the playing field and improving health and the environment." Indus. Resp't Intv'nrs' Br. 7. The Final Rule, which, as the dissent notes, EPA has calculated will cost $9.6 billion a year, includes the cost of both stages. EPA also has concluded under Executive Order 13563 that the annualized benefits are $37 to $90 billion. *See* Final Rule, 77 Fed. Reg. at 9306. (The dissent questions this conclusion, notwithstanding its promise that agency cost-benefit analyses should be reviewed deferentially.) That's "billion with a b," in the dissent's catchy phrase. Dissent at 1. In short, "the benefits of this rule outweigh its costs by between 3 to 1 or 9 to 1." Final Rule, 77 Fed. Reg. at 9306.

As the agency noted, "[u]nder section 112(n)(1)(A), EPA is evaluating whether to regulate HAP emissions from EGUs *at all*." NPRM, 76 Fed. Reg. at 24,989 (emphasis added). And there was nothing unreasonable about its conclusion that costs should not be considered in determining "whether HAP emissions from EGUs pose a hazard to public health or the environment." *Id.* at 24,988; *see id.* at 24,990. That is especially so when "Congress did not authorize the consideration of costs in listing any [other] source categories for regulation under section 112 . . . [and] did not permit the consideration of costs in evaluating whether a source category could be delisted pursuant to the provisions of section 112(c)(9)." *Id.* at 24,989. And while the dissent insists on "the centrality of cost consideration to proper regulatory decisionmaking," Dissent at 6, *Whitman* makes clear the Supreme Court believes that Congress does not necessarily agree. Nor is *Whitman* the only case in

which courts have found that Congress legislated in a way the dissent would find irrational.[3]

Academic generalities, *see* Dissent at 6–8, do not demonstrate that EPA could not reasonably proceed as it did in interpreting congressional intent — especially not generalities by academics who are criticizing the Supreme Court for failing to read congressional statutes as they do.[4] The same is true of ut-

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[3] *See Am. Textile Mfrs. Inst. v. Donovan*, 452 U.S. 490, 511–12 (1981) (holding that OSHA is not required to conduct a costbenefit analysis in promulgating a standard under section 6(b)(5) of the Occupational Safety and Health Act because "Congress uses specific language when intending that an agency engage in costbenefit analysis"); *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 184 (1978) ("The plain intent of Congress in enacting [the Endangered Species Act] was to halt and reverse the trend towards species extinction, whatever the cost."); *Union Elec. Co. v. EPA*, 427 U.S. 246, 257–58 (1976) (holding that EPA may not consider claims of economic infeasibility in evaluating a state requirement that primary ambient air quality standards be met by a certain deadline); *Lead Indus. Ass'n v. EPA*, 647 F.2d 1130, 1150 (D.C. Cir. 1980) ("We are unable to discern here any congressional intent to require, or even permit, [EPA] to consider economic . . . factors in promulgating air quality standards [under the CAA].").

[4] *See* Cass R. Sunstein, *Interpreting Statutes in the Regulatory State*, 103 HARV. L. REV. 405, 492–93 (1989) (criticizing *American Textile Manufacturers Institute*, 452 U.S. 490, for "contributing to the irrationality of the Occupational Safety and Health Act" by "refusing to read the statute" as the author would); Cass R. Sunstein, *Cost-Benefit Default Principles*, 99 MICH. L. REV. 1651, 1671 (2001) (same); Richard J. Pierce, Jr., *The Appropriate Role*

terances by single Justices — especially a separate statement by one Justice concurring in *Whitman* and a question by another during oral argument about a different statutory section. *See* Dissent at 6–7. Nor do the different approaches of the Bush and Obama Administrations on the role of costs in implementing the CAA do more than demonstrate that administrations may differ and can change positions without legal jeopardy, so long as an adequate explanation is provided as was done here. *See Chevron*, 467 U.S. at 865–66. The question before the court is not "Should EPA have considered costs in making its threshold determination under § 112(n)(1)(A)?" but rather "Was EPA required to do so at that point in its regulatory evaluation?" EPA has explained why it concluded costs were not part of the "appropriate and necessary" determination, and given Congress's choice to leave the factors entering into that determination to EPA, petitioners, and our dissenting colleague, fail to demonstrate that EPA's considered judgment about the factors to be considered was unlawful as an impermissible and unreasonable interpretation of § 112(n)(1)(A). Congress left to EPA "the accommodation of manifestly competing interests," *id.* at 865, and EPA did all that Congress required of it. Exactly how and when EGU emissions are to be regulated is a different question.

For these reasons, we hold that EPA reasonably concluded it need not consider costs in making its

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of Costs in Environmental Regulation, 54 ADMIN L. REV. 1237, 1253 (2002) (criticizing the *Whitman* Court for relying on an "anti-cost canon").

"appropriate and necessary" determination under § 112(n)(1)(A).

3. *Environmental harms.* Petitioners also contend that EPA was constrained to consider only public health hazards, not environmental or other harms, in making its "appropriate and necessary" determination. In their view, § 112(n)(1)(A) unambiguously forecloses the consideration of non-health effects because the statute requires EPA to make its "appropriate and necessary" determination after considering the results of the Utility Study, which is focused exclusively on identifying "hazards to public health" caused by EGU HAP emissions. *See* SIL Br. 44. Petitioners insist that in 2005 EPA followed the health-only approach.

EPA reasoned that "nothing in the statute suggests that the [EPA] should ignore adverse environmental effects in determining whether to regulate EGUs under section 112." NPRM, 76 Fed. Reg. at 24,988; *see* Final Rule, 77 Fed. Reg. at 9325. To the contrary, EPA concluded that the purpose of the CAA and the statute's express instruction to assess environmental effects in the *Mercury Study* suggest "it is reasonable to consider environmental effects in evaluating the hazards posed by HAP emitted from EGUs." NPRM, 76 Fed. Reg. at 24,988; *see* Final Rule, 77 Fed. Reg. at 9325. EPA explained in response to comments that restricting it from considering environmental harms would "incorrectly conflate[]the requirements for the Utility Study with the requirement to regulate EGUs under CAA section 112 if EPA determines it is appropriate and necessary to do so." Final Rule, 77 Fed. Reg. at 9325.

EPA did not err in considering environmental effects alongside health effects for purposes of the "appropriate and necessary" determination. Although petitioners' interpretation of § 112(n)(1)(A) is plausible, the statute could also be read to treat consideration of the Utility Study as a mere condition precedent to the "appropriate and necessary" determination. EPA has consistently adopted this latter interpretation, including in 2005. *See* 2005 Delisting Decision, 70 Fed. Reg. at 16,002. In the absence of any limiting text, and considering the context (including § 112(n)(1)(B)) and purpose of the CAA, EPA reasonably concluded that it could consider environmental harms in making its "appropriate and necessary" determination. The court need not decide whether environmental effects *alone* would allow EPA to regulate EGUs under § 112, because EPA did not base its determination *solely* on environmental effects. As we explain, *infra* Part II.B.5, EPA's decision to list EGUs can be sustained on the basis of its findings regarding health hazards posed by EGU HAP emissions.

4. *Cumulative impacts of HAP emissions.* On the grounds that § 112(n)(1)(A) directs EPA to study hazards reasonably anticipated to occur "as a result of" EGU HAP emissions, petitioners contend that EPA was required to base its "appropriate and necessary" determination on public health hazards that occur *exclusively* due to EGU HAPs. Thus, they contend, EPA erred in considering EGU HAP emissions that merely "contribute to" or exacerbate otherwise-occurring health hazards. Petitioners point out that EPA's interpretation conflicts with its approach in 2005, when it read § 112(n)(1)(A) to authorize regulation only upon a showing that EGU emissions *alone* would cause harm.

EPA explained that it could reasonably consider the cumulative impacts of HAP emissions because

> focusing on HAP emissions from EGUs alone when making the appropriate finding ignores the manner in which public health and the environment are affected by air pollution. An individual that suffers adverse health effects as the result of the combined HAP emissions from EGUs and other sources is harmed, irrespective of whether HAP emissions from EGUs alone would cause the harm.

NPRM, 76 Fed. Reg. at 24,988; *see* Final Rule, 77 Fed. Reg. at 9325. EPA acknowledged it was departing from its 2005 approach, *see* NPRM, 76 Fed. Reg. at 24,989, but justified the departure on grounds that the 2005 approach had been "flawed" and "non-scientific" to the extent that "EPA [had] incorrectly determined that U.S. EGU emissions of [mercury] did not constitute a hazard to public health," *id.* at 25,019; *cf.* Final Rule, 77 Fed. Reg. at 9322–23.

EPA's interpretation in the Final Rule is entitled to deference. Section 112(n)(1)(A)'s reference to hazards occurring "as a result of" EGU HAP emissions could connote hazards *caused solely* by EGU emissions, but it could also connote hazards *exacerbated* by EGU emissions. EPA's commonsense approach to this statutory ambiguity was well within the bounds of its discretion, and it adequately explained its reversal from 2005. Petitioners' contention that EPA erred in considering the effects of HAPs emitted by non-EGU sources is therefore unavailing. In any event, EPA concluded in the Mercury Study that "even if there were no other sources of [mercury] exposure, exposures associated with deposition at-

tributable to U.S. EGUs" would place the most susceptible populations above the methylmercury reference dose. NPRM, 76 Fed. Reg. at 25,010. Thus, EPA *did* find, as petitioners contend it was required to do, that EGU emissions alone would cause health hazards.

5. *Regulation under § 112(d).* Petitioners contend that even if it is "appropriate and necessary" to regulate EGU HAP emissions, such regulation should be effected under § 112(n)(1)(A) to the degree appropriate and necessary — not under § 112(d) through the imposition of MACT standards. They maintain that regulation of EGU HAPs that do not pose health hazards, or regulation at a level higher than needed to eliminate such hazards, is not regulation that is "appropriate and necessary." Petitioners contend that § 112(n)(1)(A)'s instruction to "regulate electric steam generating units *under this section*" (emphasis added) — rather than "*under § 112(d)*" — evinces congressional intent that EGU HAPs should be regulated differently than other sources. SIL Br. 36.

EPA expressly considered and dismissed petitioners' proposed interpretation. EPA concluded that the phrase "under this section" presumptively refers to regulation under *section* 112, not to regulation under *subparagraph* 112(n)(1)(A). *See* Final Rule, 77 Fed. Reg. at 9330; NPRM, 76 Fed. Reg. at 24,993. Thus, the plain statutory language suggests "EGUs should be regulated in the same manner as other categories for which the statute requires regulation." Final Rule, 77 Fed. Reg. at 9330. EPA explained:

> CAA section 112 establishes a mechanism to list and regulate stationary sources of HAP emissions. Regulation under CAA section 112

> generally requires listing under CAA section 112(c)[] [and] regulation under CAA section 112(d)[.] . . . A determination that EGUs should be listed once the prerequisite appropriate and necessary finding is made is wholly consistent with the language of section 112(n)(1)(A), and listed sources must be regulated under CAA section 112(d).

Id.; see also id. at 9326.

EPA acted properly in regulating EGUs under § 112(d). Section 112(n)(1)(A) directs the Administrator to "regulate electric steam generating units under this section, if the Administrator finds such regulation is appropriate and necessary." CAA § 112(n)(1)(A), 42 U.S.C. § 7412(n)(1)(A). EPA reasonably interprets the phrase "under this section" to refer to the entirety of section 112. *See Desert Citizens Against Pollution v. EPA*, 66 F.3d 524, 527 (D.C. Cir. 2012). Under section 112, the statutory framework for regulating HAP sources appears in § 112(c), which covers listing, and § 112(d), which covers standard-setting. *See* CAA § 112(c), 112(d), 42 U.S.C. § 7412(c), 7412(d). This court has previously noted that "where Congress wished to exempt EGUs from specific requirements of section 112, it said so explicitly." *New Jersey*, 517 F.3d at 583. EPA reasonably concluded that the framework set forth in § 112(c) and § 112(d) — rather than another, hypothetical framework not elaborated in the statute — provided the appropriate mechanism for regulating EGUs under § 112 after the "appropriate and necessary" determination was made. Therefore, EPA's interpretation is entitled to deference and must be upheld.

6. *Regulation of all HAP emissions.* In the Final Rule, EPA claimed authority to promulgate standards for all listed HAPs emitted by EGUs, not merely for those HAPs it has expressly determined to cause health or environmental hazards. *See, e.g.*, 77 Fed. Reg. at 9325–26. Petitioners challenge this approach, maintaining that § 112(n)(1)(A) limits regulation to those individual HAPs that are "appropriate and necessary" to regulate. Petitioners also object that EPA's interpretation contradicts its 2005 rulemaking when it supported a substance-by-substance approach to regulation.

EPA explained its disagreement with petitioners' proposed approach. First, EPA reiterated its view that once an "appropriate and necessary" determination is properly made, "EGUs should be regulated under section 112 in the same manner as other categories for which the statute requires regulation." Final Rule, 77 Fed. Reg. at 9326. EPA then reasoned that this court's decision in *National Lime*, 233 F.3d at 633, "requires [EPA] to regulate *all* HAP from major sources of HAP emissions once a source category is added to the list of categories under CAA section 112(c)." *Id.* (emphasis added). In other words, EPA concluded that if EGUs are to be regulated in the same manner as other source categories, then *all* HAPs emitted by EGUs should be subject to regulation. *See id.*

EPA did not err by concluding that it may regulate all HAP substances emitted by EGUs. In *National Lime*, 233 F.3d at 633, this court considered whether § 112(d)(1) permitted EPA "to set emission levels only for those listed HAPs" that could be controlled with existing technology. Concluding that

EPA had a "clear statutory obligation to set emission standards for each listed HAP," the court held that "the absence of technology-based pollution control devices for HCl, mercury, and total hydrocarbons did not excuse EPA from setting emission standards for those pollutants." *Id.* at 634. Although petitioners attempt to distinguish *National Lime* on grounds that it concerned "major sources" rather than EGUs, they have not provided any compelling reason why EGUs should not be regulated the same way as other sources once EPA has determined that regulation under § 112 is "appropriate and necessary." It also bears emphasis that the plain text of § 112(n)(1)(A) directs the Administrator to "regulate electric utility steam generating units"—not to regulate their *emissions*, as petitioners suggest. This source-based approach to regulating EGU HAPs was affirmed in *New Jersey*, 517 F.3d at 582, which held that EGUs could not be delisted without demonstrating that EGUs, as a category, satisfied the delisting criteria set forth in § 112(c)(9). The notion that EPA must "pick and choose" among HAPs in order to regulate only those substances it deems most harmful is at odds with the court's precedent.

To the extent EPA's interpretation differs from its 2005 approach, it adequately explained its decision. *See* Final Rule, 77 Fed. Reg. at 9325–26. Although petitioners suggest otherwise, the 2005 Delisting Decision did not address whether EPA could regulate all listed EGU HAPs following an "appropriate and necessary" determination. Here, EPA offered a reasoned explanation for its approach; no more is required. *See Fox Television Stations*, 556 U.S. at 515; *Nat'l Cable & Telecomms. Ass'n*, 545 U.S. at 981.

In view of the above, EPA's conclusion that it may regulate *all* HAP emissions from EGUs must be upheld.

III.

A.

Petitioners assert that even if EPA has correctly interpreted § 112(n)(1)(A), the emission standards that EPA promulgated in the Final Rule are flawed in several respects.

1. *Appropriate and necessary determination.* Petitioners first contend that the agency's determination that it was "appropriate and necessary" to regulate EGUs is arbitrary and capricious. Consistent with their position on the proper interpretation of § 112(n)(1)(A), petitioners take a HAP-by-HAP approach to criticizing EPA's Finding. But, as we explained above, EPA reasonably interprets the CAA as allowing it to regulate *all* EGU HAP emissions pursuant to the usual MACT program once it makes the threshold "appropriate and necessary" determination. The question then is whether EPA reasonably found it appropriate and necessary to regulate EGUs based on all the record evidence before it.

EPA's "appropriate and necessary" determination in 2000, and its reaffirmation of that determination in 2012, are amply supported by EPA's findings regarding the health effects of mercury exposure. Mercury exposure has adverse effects on human health, primarily through consumption of fish in which mercury has bioaccumulated. *See* Final Rule, 77 Fed. Reg. at 9310. And EGUs are the largest domestic source of mercury emissions. *Id.* Petitioners do not dispute these basic facts, but instead take issue with

whether EPA has sufficiently quantified the contribution of EGU mercury emissions to overall mercury exposure. Our case law makes clear, however, that EPA is not obligated to conclusively resolve every scientific uncertainty before it issues regulation. *See Coal. for Responsible Regulation v. EPA*, 684 F.3d 102, 121 (D.C. Cir. 2012) ("If a statute is precautionary in nature and designed to protect the public health, and the relevant evidence is difficult to come by, uncertain, or conflicting because it is on the frontiers of scientific knowledge, EPA need not provide rigorous step-by-step proof of cause and effect to support an endangerment finding.") (internal quotation marks omitted). Instead, "[w]hen EPA evaluates scientific evidence in its bailiwick, we ask only that it take the scientific record into account in a rational manner." *Id.* at 122 (internal quotation marks omitted).

EPA did so here. As explained in the technical support document (TSD) accompanying the Final Rule, EPA determined that mercury emissions posed a significant threat to public health based on an analysis of women of child-bearing age who consumed large amounts of freshwater fish. *See* Mercury TSD; NPRM, 76 Fed. Reg. at 25,007; Final Rule, 77 Fed. Reg. at 9311–17. The design of EPA's TSD was neither arbitrary nor capricious; the study was reviewed by EPA's independent Science Advisory Board, which stated that it "support[ed] the overall design of and approach to the risk assessment" and found "that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs." SAB Letter to EPA Administrator Jackson at 2 (Sept. 29, 2011), EPA-SAB-11-017. In addition, EPA revised

the final TSD to address SAB's remaining concerns regarding EPA's data collection practices. *See* Final Rule, 77 Fed. Reg. at 9313–16.[5]

Petitioners' remaining objections center on the change in EPA's position between 2005 and 2012. Although petitioners are correct that EPA weighed certain pieces of evidence differently at different times, the agency reasonably and adequately explained its basis for changing its position on whether mercury emissions posed a sufficient risk to constitute a public health hazard. *See* EPA Br. 40; NPRM, 76 Fed. Reg. at 25,019–20. EPA identified and analyzed what it viewed as technical flaws in the scientific analysis supporting the 2005 Delisting Decision, including a failure to evaluate the cumulative health hazard from EGU emissions when combined with other sources of mercury, NPRM, 76 Fed. Reg. at 25,019, and health hazards from methylmercury exposure above the reference dose, *id.* at 25,020. Those

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[5] For the reasons explained in *UARG v. EPA*, Nos. 12-1166, 12-1366, 12-1420, 2014 WL 928230 (D.C. Cir. Mar. 11, 2014), we do not address petitioners' claims that SAB's final report on the Mercury TSD was submitted too late to allow public comment and that EPA unreasonably refused SAB's request to review the final TSD. Petitioners did not raise those issues in comments, and reconsideration is still pending before the agency. Even if these arguments had been properly presented to the agency, petitioners would have forfeited them by raising them only in a cursory footnote in their opening brief before this court. *See Hutchins v. Dist. of Columbia*, 188 F.3d 531, 539 n.3 (D.C. Cir. 1999) (en banc) ("We need not consider cursory arguments made only in a footnote").

explanations are sufficient to meet the agency's burden. *See Fox Television Stations*, 556 U.S. at 514–16.

2. *Major source classification*. Petitioners contend that in setting emission standards for EGUs, EPA was required to distinguish between "major sources" and "area sources." As relevant here, major sources are automatically subject to MACT controls, while area sources may, in EPA's discretion, be regulated under alternative standards. *See* CAA § 112(a)(1), 112(a)(2), 112(d)(5), 42 U.S.C. § 7412(a)(1), 7412(a)(2), 7412(d)(5). Petitioners assert that EPA's failure to segregate the different types of sources fatally compromises the Final Rule because the EGU emission standards should have been based exclusively on data from major source EGUs. But § 112(d) does not require EPA to regulate EGUs as "major sources" and "area sources"; it merely says that, *if* EPA lists major and area sources, it must then regulate them according to the separate provisions. *See* CAA § 112(d)(1), 42 U.S.C. § 7412(d)(1).

EPA's decision not to draw such a distinction here is a reasonable one. As EPA emphasizes, distinguishing between major source and area source EGUs runs counter to the separate statutory provisions governing EGUs. While other sources are classified as major or area sources depending on the quantity of emissions they emit, § 112 specifically defines EGUs in terms of their electrical output. *Compare* CAA § 112(a)(8), *with* CAA § 112(a)(1)–(2). Consistent with ordinary rules of statutory construction, EPA reasonably relied on the more specific definition in § 112(a)(8) rather than the general definitions applicable to all other sources. *See RadLAX Gateway Hotel, LLC v. Amalgamated Bank*, 132 S. Ct. 2065,

2070–72 (2012). Requiring EPA to classify EGUs as major or area sources would also create redundancy in the source-category listing criteria. Section 112(c)(3) of the CAA requires EPA to list area sources for regulation if EPA determines that they "warrant[]regulation." CAA § 112(c)(3), 42 U.S.C. § 7412(c)(3). That finding is arguably unnecessary as applied to EGUs given the requirement in § 112(n)(1)(A) that EPA make a finding that regulation of all EGUs is "appropriate and necessary."

EPA also did not err in declining to exercise its discretionary authority to require less stringent "generally available control technology," or GACT, standards, rather than MACT standards. *Id.* § 112(d)(5), 42 U.S.C. § 7412(d)(5). In the Final Rule, EPA expressly and reasonably determined that setting separate GACT standards for area source EGUs was unnecessary. *See* Final Rule, 77 Fed. Reg. at 9404, 9438 ("[S]imilar HAP emissions and control technologies are found on both major and area sources" such that "there is no essential difference between area source and major source EGUs with respect to emissions of HAP.").

For these reasons, EPA reasonably declined to interpret § 112 as mandating classification of EGUs as major sources and area sources.

3. *Mercury MACT floor.* Petitioners next challenge EPA's standards for mercury emissions from existing coal-fired EGUs. Petitioners maintain that in calculating the MACT floor for those units, EPA collected emissions data from only those EGUs that were best-performing for mercury emissions. Consequently, petitioners insist, the mercury MACT standard reflects the results achieved by the "best of the

best" EGUs, and not the results of the best 12% of all EGUs, as required by statute.

Petitioners' assertions of a biased or irrational data collection process are not supported by a review of the record. "EPA typically has wide latitude in determining the extent of data-gathering necessary to solve a problem." *Sierra Club v. EPA*, 167 F.3d 658, 662 (D.C. Cir. 1999). Here, EPA determined that a three-pronged approach was appropriate for developing the mercury MACT standard. First, EPA asked all EGUs for all of their data from 2005–10; it received data from 168 units. Information Collection Request ("ICR") Supporting Statement Part A at 9; *see generally* MACT Floor Analysis Spreadsheets. Second, EPA requested and received data from 50 randomly selected EGUs. ICR Supporting Statement Part B at 2, 7–8. Finally, EPA requested and received data from 170 of the best-performing units for non-mercury emissions. *Id.* EPA initially thought that third group would also be the bestperforming for mercury emissions, but it discovered that was not the case after examining the data. *See* Responses to Comments, Dec. 2011, v.1, at 573–76 ("RTC").

Based on the results of its ICR, covering a total of 388 EGUs, EPA chose "the average emission limitation achieved by the best performing 12 percent" of all existing sources "for which [it] ha[d] emissions information," as authorized by CAA § 112(d)(3)(A). *See* NPRM, 76 Fed. Reg. at 25,022–23. Although, as EPA acknowledges, it would be arbitrary and capricious for EPA to set a MACT floor based on intentionally skewed data, the facts indicate that EPA did not do so here. Nor does the record suggest that EPA's data collection efforts resulted in unintentional bias. As

previously noted, EPA collected data from a wide range of EGUs because the agency concluded that it could not identify units representing the best-performing 12 percent of mercury emitters. That conclusion is borne out by the data in the record, which showed that some of the best-performing units for particulate matter control were among the worst performing units for mercury control. *See generally* MACT Floor Analysis Spreadsheets. Similarly, many of the mercury best performers (32 of the best performing 126 units) were not drawn from the pool of units that EPA targeted as best performers for particulate matter. *See* RTC v. 1 at 575. In short, EPA's data-collection process was reasonable, even if it may not have resulted in a perfect dataset.

4. *Acid gas HAP.* EPA did not conclusively determine that emissions of acid gases such as hydrogen chloride from EGUs pose a health hazard. *See* NPRM, 76 Fed. Reg. at 25,016 ("our case studies did not identify significant chronic non-cancer risks from acid gas emissions"). Petitioners say that given that conclusion, EPA should have established a less stringent, healthbased emission standard for acid gases under § 112(d)(4). That provision states: "With respect to pollutants for which a health threshold has been established, the Administrator may consider such threshold level, with an ample margin of safety, when establishing emission standards under this subsection." CAA § 112(d)(4), 42 U.S.C. § 7412(d)(4). Section 112(d)(4) makes clear, however, that EPA's authority to set alternate standards is discretionary. *See id.* ("the Administrator *may* consider such threshold level") (emphasis added). Here, EPA concluded that it lacked enough evidence to determine whether an alternative standard would protect

health "with an ample margin of safety." *See* Final Rule, 77 Fed. Reg. at 9405–06. Petitioners dispute EPA's weighing of the evidence, but petitioners offer no compelling basis for second-guessing EPA's analysis.

Petitioners also suggest that regulation of EGU acid gas emissions to address ecosystem acidification conflicts with Congress's decision in the 1990 CAA amendments to address such acidification in Title IV of the CAA. *See* SIL Reply Br. 5. But petitioners failed to raise that argument before the agency, and did not raise it in this court until their reply brief. We therefore deem the argument forfeited. *See Bd. of Regents of Univ. of Washington v. EPA*, 86 F.3d 1214, 1221 (D.C. Cir. 1996).

5. *UARG delisting petition*. The Utility Air Regulatory Group (UARG) filed a petition with EPA seeking to remove coal-fired EGUs from the list of sources regulated under § 112. EPA denied the petition. Petitioners now argue that that denial was arbitrary and capricious for the same reasons they assert that the agency's determination that it is "appropriate and necessary" to regulate EGUs was incorrect. Assuming, without deciding, that EPA can delist only a subset of the EGU source category, we reject petitioners' argument on this point. As EPA explained in the Final Rule, UARG's delisting petition did not demonstrate that EPA could make either of the two predicate findings required for delisting under § 112(c)(9)(B): (1) that no source in the category emits HAP "in quantities which may cause a lifetime risk of cancer greater than one in one million to the individual in the population who is most exposed" and (2) that emissions from no source in the category "exceed

a level which is adequate to protect public health with an ample margin of safety." CAA § 112(c)(9)(B), 42 U.S.C. § 7412(c)(9)(B); *see also* Final Rule, 77 Fed. Reg. at 9364–65 (discussing technical flaws in UARG's risk analysis).

6. *Chromium emissions data.* Finally, petitioners question the validity of EPA's case study regarding risks from nonmercury EGU emissions. As relevant here, that study found that at 6 of 16 tested facilities, emissions of HAP posed a lifetime cancer risk of more than one in a million to the most exposed individuals. *See* Final Rule, 77 Fed. Reg. at 9319. Petitioners contend that EPA's cancer-risk finding was the product of contaminated emissions samples, and that EPA has refused to correct the emissions data it used. In making this argument, they rely on their own independent "subsequent resampling" of the facilities that EPA examined in conducting its inhalation risk assessment. SIL Br. 52 n.58; UARG, Petition for Reconsideration of MATS Rule at 6–7 (Apr. 16, 2012), EPAHQ- OAR-2009-0234-20179 (J.A. 2493–94).

EPA did not act arbitrarily or capriciously in relying on the chromium emissions data to which petitioners object. As EPA explained in its responses to comments, the data came from source representatives themselves. RTC v.1 at 187. EPA reasonably believed that these representatives — given their "concern[] about data accuracy" — would review "all data before certifying their accuracy and submitting them to the EPA." *Id.* EPA did not err in relying on this certified data. We cannot consider the data from petitioners' independent resampling, which was conducted after the Final Rule issued and was not part of the

administrative record. *See* CAA § 307(d)(7)(A), 42 U.S.C. § 7607(d)(7)(A).

B.

A group of electric utilities and industry groups have filed a separate petition raising issues specific to industry. Many of industry petitioners' arguments concern circulating fluidized bed EGUs, or CFBs. As relevant here, CFBs differ from conventional pulverized coal units in that CFBs inject air and additional materials, such as limestone, into the combustion zone in order to achieve lower-temperature combustion. At that lower temperature, fuel breaks down to a lesser degree, thus enabling CFBs to control emissions without using add-on controls.

Industry petitioners argue that these design differences required EPA to create a separately regulated subcategory for CFBs. They emphasize that EPA recognized the need for a CFB subcategory in a different rulemaking proceeding, the "Boiler MACT" Rule.

Industry petitioners' CFB-related arguments are unavailing. Contrary to industry petitioners' assertions, nothing in the Clean Air Act "requires" EPA to create a CFB subcategory. Rather, the statute gives EPA substantial discretion in determining whether subcategorization is appropriate. *See* CAA § 112(d)(1), 42 U.S.C. § 7412(d)(1) (EPA "*may* distinguish among classes, types, and sizes of sources") (emphasis added); *see also Nat'l Ass'n of Clean Water Agencies v. EPA*, 734 F.3d 1115, 1159 (D.C. Cir. 2013) ("EPA's subcategorization authority under § 112 involves an expert determination, placing a heavy burden on a challenger to overcome deference to EPA's

articulated rational connection between the facts found and the choice made.") (internal quotation marks omitted). EPA's decision not to create a CFB subcategory in the Final Rule is reasonable and well-supported by the record. Among other things, EPA noted that CFBs were among the best and worst performers for various pollutants, indicating that CFBs have emissions profiles similar to other coal-fired units despite their operational differences. *See* Final Rule, 77 Fed. Reg. at 9397.

The record similarly supports EPA's determination that the 0.002 lb/MMBtu hydrogen chloride limit for CFBs is achievable. As noted above, some CFB units were among the top performers for each of the regulated pollutants, including hydrogen chloride. *See id.* The record thus demonstrates that at least some CFB units are in fact able to achieve the hydrogen chloride limit. In any event, the fact that the Final Rule may not be cost effective for all CFBs does not necessarily mean EPA erred in declining to create a CFB subcategory or in setting emission standards applicable to those units.

EPA's decision to subcategorize CFBs in the Boiler MACT Rule is not to the contrary. There, EPA concluded that CFBs presented relevant differences with respect to carbon monoxide— not mercury, acid gases, or particulates (the pollutants at issue in this rulemaking). *See National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters*, 76 Fed. Reg. 15,608, 15,617–18 (Mar. 21, 2011).

Industry petitioners further argue that at a minimum, EPA should have set separate acid gas stand-

ards for coal-refuse-fired CFBs. Those units burn waste coal from other coal-mining operations and use the resulting ashes in mine reclamation projects. Industry petitioners maintain that these fuel-ash reuse efforts would be imperiled by the stringency of the acid gas standards in the Final Rule.

We conclude that EPA reasonably decided that separate standards for coal-refuse-fired CFBs were not warranted. Industry petitioners' assertion that the hydrogen chloride standards are unattainable for coal-refuse-fired CFBs is undermined by the fact that some of those units were among the best performers for hydrogen chloride. *See* RTC v.1 at 587. EPA also suggested alternative compliance methods that it says would permit coal-refuse-fired CFBs to continue participating in reclamation efforts. *See* Final Rule, 77 Fed. Reg. at 9412. Regardless, nothing in the CAA obligates EPA to set standards in a way that always allows the re-use of fuel ash, even if doing so might be a more desirable outcome for some EGU operators.

C.

In contrast to its decision on CFBs, EPA did create a subcategory for lignite-fired EGUs. (Lignite coal is also referred to as "low rank" coal due to its low heat content.) Industry petitioners argue that the emission standard for the lignite subcategory is based on an improperly calculated minimum stringency level, or MACT floor. Industry petitioners also contend that the emission standard set by EPA is not achievable. We consider these arguments in turn.

1. *MACT floor.* Industry petitioners insist that EPA incorrectly calculated the MACT floor for lignite

units, rendering that standard arbitrary and capricious. They assert that EPA used "cherry picked" data from the top 6% of units, instead of the top 12% as required by § 112(d)(3)(A). Finally, industry petitioners argue that EPA did not properly account for variability in lignite coal.

Industry petitioners' data-bias argument is similar to the argument made by the State, Industry & Labor petitioners regarding the mercury MACT floor, *supra* Part III.A.3. And, as with that argument, petitioners' assertions regarding the lignite MACT floor find no support in the record. EPA has offered a reasonable, non-biased explanation of its data-collection and analysis process. *See* MACT Floor Memo at 10; RTC v.1 at 559–60.

Industry petitioners' objections regarding the variability of lignite coal likewise fail. EPA accounted for variability due to differing chemical compositions of coal by applying its Upper Prediction Limit analysis. *See* NPRM, 76 Fed. Reg. at 25,041. Industry petitioners do not challenge that analysis itself. They do suggest in passing that EPA's results are flawed, *see* Industry Pet'rs' Br. 10, but offer no explanation as to why that is so. Such cursory treatment is inadequate to place their challenge to EPA's variability analysis before the court, because "it is not enough merely to mention a possible argument in the most skeletal way, leaving the court to do counsel's work, create the ossature for the argument, and put flesh on its bones." *Davis v. Pension Benefit Guar. Corp.*, 734 F.3d 1161, 1166–67 (D.C. Cir. 2013) (internal quotation marks and alterations omitted). While EPA acknowledged that it could not account for all operational variability, it concluded that its variability

analysis "is an appropriate method of addressing the concern that these standards must be met at all times." RTC v.1 at 458. EPA's explanation is sufficient to withstand our "extremely deferential" review of this kind of technical judgment. *New York v. Reilly*, 969 F.2d 1147, 1152 (D.C. Cir. 1992).

2. *Beyond-the-floor limit.* EPA is permitted to set a more restrictive, "beyond-the-floor" emission standard if the agency determines that such a standard is "achievable" considering costs, energy requirements, and applicable control technologies. CAA § 112(d)(2), 42 U.S.C. § 7412(d)(2). To be "achievable," a standard "must be capable of being met under most adverse conditions which can reasonably be expected to recur." *Nat'l Lime Ass'n v. EPA*, 627 F.2d 416, 431 n.46 (D.C. Cir. 1980). In this case, industry petitioners argue that EPA failed to consider the limitations of applicable control technologies. As a result, petitioners contend, EPA's beyond-the-floor standard for lignite-fired EGUs is not achievable because the standard mandates unrealistically high levels of mercury reduction.

We reject petitioners' challenge to the beyond-the-floor standard. EPA concluded during the rulemaking process that the standard for lignite units is achievable if sources increase their use of a particular control technology, activated carbon injection. *See* Beyond-the-Floor Memo at 1–4. According to EPA, increased carbon injection can reduce emissions by up to 90%, well in excess of the reductions necessary to reach beyond-the-floor levels. *Id.* at 1–2. Ultimately, the dispute on this issue amounts to a factual disagreement between EPA and petitioners over the effectiveness of activated carbon injection. Because the

record contains no data inconsistent with EPA's position on the efficacy of activated carbon injection, we defer to the agency's determination that the beyond-the-floor emission standard for lignite-fired EGUs is achievable.

D.

Public utility companies are subject to certain state-law contracting requirements that may lengthen the process of installing upgraded controls. That added time, industry petitioners argue, requires EPA to grant a blanket, one-year extension of the compliance deadline to public power companies. We disagree. Once again, petitioners' argument amounts to a claim that a decision the Clean Air Act leaves to EPA's discretion should instead be mandatory. *See* CAA § 112(i)(3)(B), 42 U.S.C. § 7412(i)(3)(B) (EPA "may issue" an extension under certain circumstances). EPA explained at length why such a blanket extension was inappropriate. *See* Final Rule, 77 Fed. Reg. at 9407, 9409–11. Most importantly, industry petitioners did not show — and likely could not show— that an extension is necessary for the installation of controls at *every* public power company. On the contrary, EPA's data indicated that "most units will be able to fully comply" within the three-year period established by EPA. Final Rule, 77 Fed. Reg. at 9410. EPA's decision not to issue a blanket extension therefore was not arbitrary or capricious.[6]

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[6] To the extent that petitioners object to EPA's alleged failure to respond to comments on this issue made by public power companies on the ground that this failure violates CAA § 307(d)(6)(B), 42 U.S.C. § 7607(d)(6)(B), we do

IV.

We turn to the challenges by Environmental petitioners and Julander Energy Company.

A.

Environmental petitioners challenge the provisions of the Final Rule that allow compliance with emission standards to be demonstrated through (1) emissions averaging and (2) options for non-mercury metal HAP emissions monitoring. Chesapeake Climate Action Network, Conservation Law Foundation, Environmental Integrity Project, and Sierra Club object to averaging as unlawful; Chesapeake Climate Action Network and Environmental Integrity Project object to the monitoring options as failing to provide reasonable assurance of compliance. They presented their objections (save one) during the comment period and EPA has responded to them. Although the challenges to emissions averaging are also pending before EPA in a petition for reconsideration, and usually would be incurably premature, *see, e.g.*, *Clifton Power Corp. v. FERC*, 294 F.3d 108, 112 (D.C. Cir. 2002), the text and legislative history of the Clean Air Act make clear this usual approach is inapplicable, *see UARG v. EPA*, Nos. 12-1166, 12-1366, 12-1420, 2014 WL 928230, at *3 (D.C. Cir. Mar. 11, 2014); CAA

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not address that objection because it was first raised in a pending petition for reconsideration. *See UARG*, 2014 WL 928230, at *4. We also do not address industry petitioners' arguments concerning the standards for petroleum-coke-fired EGUs and liquid oil-fired non-continental EGUs because those arguments were likewise first raised in a pending petition for reconsideration.

§ 307(b)(1), 42 U.S.C. § 7607(b)(1); S. Rep. No. 101-228, at 3755 (1989).

1. *Averaging*. Under the Final Rule, existing contiguous, commonly-controlled EGUs in the same subcategory can demonstrate compliance by averaging their emissions as an alternative to meeting certain requirements on an individual basis. Final Rule, 77 Fed. Reg. at 9384, 9473–76 (codified at 40 C.F.R. § 63.10009). Averaging is permissible only between the same types of pollutants, individual EGUs that are part of the same affected source, EGUs subject to the same emission standard, and existing (not new) EGUs. *Id.* at 9385. Each facility intending to use emissions averaging must develop an emissions averaging plan identifying "(1) [a]ll units in the averaging group; (2) the control technology installed; (3) the process parameter that will be monitored; (4) the specific control technology or pollution prevention measure to be used; (5) the test plan for the measurement of the HAP being averaged; and (6) the operating parameters to be monitored." *Id.* at 9385–86.

Environmental petitioners contend the averaging alternative is unlawful because it relaxes the stringency of the MACT floor standards. With one exception, EPA set the MACT floor standards based on a thirty-boiler operating day averaging period. *Id.* at 9385, 9479–80. Allowing multiple EGUs to average their emissions data effectively extends, petitioners maintain, the standards' averaging period to sixty days (for two units), ninety days (for three units), or more. In their view, a longer averaging period permits longer and larger pollution spikes because high measurements can be averaged over more hours of normal, lower-pollution operations.

Section 112(d)(3), 42 U.S.C. § 7412(d)(3), provides that emission standards for existing sources "shall not be less stringent" than "the average emission limitation achieved by the best performing 12 percent" of such sources. The subsection (d)(2) "beyond-the-floor" requirement provides that emission standards for new or existing sources "shall require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section . . . that the Administrator . . . determines is achievable." CAA § 112(d)(2), 42 U.S.C. § 7412(d)(2).

EPA permissibly interpreted § 112(d) to allow emissions averaging as provided for in the Final Rule. *See Chevron*, 467 U.S. at 843. That section neither expressly allows nor disallows emissions averaging among multiple units. In the Final Rule, EPA stated:

> Averaging across affected units is permitted only if it can be demonstrated that the total quantity of any particular HAP that may be emitted by that portion of a contiguous major source that is subject to the same standards in the [Final Rule] will not be greater under the averaging mechanism than it could be if each individual affected EGU in the subcategory complied separately with the applicable standard. Under this test, the practical outcome of averaging is equivalent to compliance with the MACT floor limits by each discrete EGU, and the statutory requirement that the MACT standard reflect the maximum achievable emissions reductions is, therefore, fully effectuated.

77 Fed. Reg. at 9385. Viewing averaging as "an equivalent, more flexible, and less costly alternative" to requiring units to demonstrate compliance individually, EPA explained that permitting averaging is part of its "general policy of encouraging the use of flexible compliance approaches where they can be properly monitored and enforced." *Id.*

Environmental petitioners concede the averaging alternative will not result in an increase in a source's total emissions beyond the level permitted under the applicable standard, *see* Envtl. Pet'rs' Br. 18, and while theoretically averaging could allow an individual unit's emissions to exceed the standard, under the Final Rule that exceedance must be offset by other, better-performing units to demonstrate compliance. They have not challenged EPA's interpretation of the ambiguous term "source," which EPA defined as referring to "the collection of coal- or oil-fired EGUs . . . within a single contiguous area and under common control," Final Rule, 77 Fed. Reg. at 9366, rather than a single EGU. Because § 112(d)(3), 42 U.S.C. § 7412(d)(3), requires EPA to prescribe emissions limitations for "sources," not units, EPA could permissibly establish a standard that allows averaging within a single source. *Cf. Chevron*, 467 U.S. at 866. Although this may allow individual units to exceed the emissions limitation, the statute does not require EPA to regulate emissions on a unit level.

As EPA has observed, Environmental petitioners' main objection appears to be that the Final Rule does not include a "discount factor" whereby emission rates are reduced for sources using an averaging alternative. Petitioners point, for example, to the discount factor included in the Hazardous Organic

NESHAP rule, Envtl. Pet'rs' Br. 9–10, in which EPA determined that "to carry out the mandate of section 112(d)(2), some portion of these cost savings [from averaging] should be shared with the environment by requiring sources using averaging to achieve more emission reductions than they would otherwise."[7]

To the extent petitioners' objection is that EPA failed to explain why it did not include a discount factor, EPA, in fact, offered a reasonable and adequate explanation. In the Final Rule, EPA explained that "[g]iven the homogeneity of fuels within the rules subcategories, along with other emissions averaging criteria, the Agency believes use of a discount factor to be unwarranted for this rule." Final Rule, 77 Fed. Reg. at 9386. Further, in responding to comments, EPA explained that unlike the Hazardous Organic rule, "which covers a broad number of unit types, products, and processes," EGUs subject to the Final Rule "differ generally only in the fuel used to produce electricity," a difference, EPA concluded, "accounted for . . . by prohibiting units from differing subcategories — which are fuel based — from participating in emissions averaging." RTC v.2 at 361–62. EPA noted as well its agreement that "other safety factors in the rule obviate the need for a discount factor," *id.* at 363, including the requirement averaging start within three years of promulgation of the Final Rule.

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[7] *National Emission Standards for Hazardous Air Pollutants for Source Categories; Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry and Other Processes Subject to the Negotiated Regulation for Equipment Leaks*, 59 Fed. Reg. 19,402, 19,430 (Apr. 22, 1994).

The suggestion by Environmental petitioners that EPA improperly relied on its Upper Prediction Limit ("UPL") analysis to mitigate the effect of averaging on the stringency of emission standards fares no better. The UPL analysis in the MACT floor calculation is designed to "assess variability of the best performers." NPRM, 76 Fed. Reg. at 25,041. To the extent petitioners point to EPA's statement in responding to comments, they ignore its context. EPA stated that it "disagrees with the suggestion that another variability component need be considered for those EGU owners or operators who choose to engage in emissions averaging; the current UPL analyses was [sic] developed to take factors such as those mentioned by the commenter into account." RTC v.2 at 363. According to Environmental petitioners, "the UPL analyses contain nothing that would eliminate (or even mitigate) the Averaging Alternative's additional relaxation of the standards," and it was therefore inappropriate for EPA to rely on this analysis in support of the Final Rule's emissions averaging provisions. Envtl. Pet'rs' Br. 20. But there is nothing to indicate this is what EPA did. In its statement, EPA was responding to industry comments arguing that because EPA had accounted for individual-unit variability in the UPL analysis in setting MACT floors, it was inappropriate to allow a multi-unit facility to further reduce variability by averaging, without applying a discount factor. It is far too great a stretch to read EPA's response as an admission that EPA relied on its UPL analysis to support emissions averaging.

2. *Monitoring*. The Final Rule provides three alternatives to continuous emissions monitoring to demonstrate compliance with the non-mercury metal HAP standards. They are: (1) use of a continuous

parametric monitoring system ("CPMS"), (2) quarterly performance testing, and (3) performance testing once every three years for qualifying low emitting EGUs. *See Final Rule*, 77 Fed. Reg. at 9466 (codified at 40 C.F.R. § 63.10000(c)(1)(iii-iv)). Environmental petitioners first challenged CPMS in a pending petition for reconsideration, and therefore that challenge is not properly before the court for decision now. *See UARG*, 2014 WL 928230, at *4, *5 n.4.

Any EGU may demonstrate compliance with the nonmercury metal standards through quarterly performance tests. Final Rule, 77 Fed. Reg. at 9372, 9384, 9466. If a unit's emission results for all required tests are less than 50 percent of the applicable emission limit for a three-year period, the EGU may qualify as a low emitting EGU for non-mercury metal HAPs and is then required to conduct performance testing only once every three years, so long as it maintains compliance. *Id.* at 9371, 9466, 9471.

Environmental petitioners maintain that stack testing conducted quarterly or once every three years cannot provide reasonable assurance of compliance with a standard set as a thirty-day emissions rate, given EPA's determination that stack test results are highly variable, and that EPA has failed to explain how compliance options involving long intervals between performance tests and lacking any control of operating conditions between tests can provide sufficiently timely or reliable information to assure compliance. EPA has provided a reasonable explanation for its determination that each of these monitoring options complies with the statutory requirements of CAA §§ 114 and 504.

Section 504(b), 42 U.S.C. § 7661c(b), provides that "continuous emissions monitoring need not be required if alternative methods are available that provide sufficiently reliable and timely information for determining compliance." Although § 114(a)(3), 42 U.S.C. § 7414(a)(3), "require[s] enhanced monitoring" for major stationary sources, there is "no presumption in favor of any particular type of monitoring." *Sierra Club*, 353 F.3d at 991. EPA has "broad discretion in selecting a monitoring regime that ensures compliance," and as long as it "reasonably articulate[s] the basis for its decision," *id.*, the court will "defer to the informed discretion of the Agency," recognizing that "analysis of this issue requires a high level of expertise," *id.* (quoting *Nat'l Lime*, 233 F.3d at 635).

EPA explained that, in its judgment, "[t]he quarterly stack testing period, coupled with underlying monitoring of control devices or the additional monitoring for liquid oil-fired units, is expected to be frequent enough to ensure that a unit's emissions control devices and processes continue to operate in the same manner as during the previous stack test." RTC v.2 at 93. "If there are significant changes to the operation of the unit or the fuel, then a retest is required to reconfirm that the source remains in compliance under the new operating circumstances." *Id.* EPA acknowledged, with respect to the low emitting EGU option, that the available data "shows an EGU's potential variability," but reasoned that "well-operated EGUs — such as those qualifying for [low emitting EGU] status — are expected to have much less variable emissions" and that "the requirement to revert to the original monitoring frequency should subsequent emissions testing show the EGUs no

longer meet [low emitting EGU] status will keep source owners or operators interested in maintaining [that] status." *Id.* at 244. EPA has provided a reasonable explanation for its determinations that these two monitoring options provide sufficient assurance of compliance with the applicable emission standards.

B.

Julander Energy Company, an oil and natural gas development, exploration, and production company, challenges EPA's decision not to adopt stricter emission standards by requiring "fuel switching" by EGUs from coal to natural gas. It contends that EPA unlawfully relied on a non-statutory factor (prohibition of construction of new coal-fired EGUs), failed to consider a required statutory factor (§ 112's requirement that EPA consider collateral benefits of control options), and reached arbitrary and capricious conclusions about natural gas supply and infrastructure and costs.

As a threshold matter, the court must address Julander's standing. Industry intervenor-respondents contend Julander lacks standing under Article III of the Constitution. In fact, Julander's "injury in fact," causation, and redressability under Article III, *see Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560–61 (1992), are self-evident, *see Sierra Club v. EPA*, 292 F.3d 895, 899–900 (D.C. Cir. 2002), insofar as the Final Rule does not require EGUs to switch to natural gas, to the detriment of Julander's stated interests, and on remand EPA could require fuel switching. EPA, however, contends Julander lacks "prudential standing" because its interests do not come within the zone-of-interests test articulated in *Association of*

Data Processing Service Organizations, Inc. v. Camp, 397 U.S. 150 (1970). The Supreme Court recently clarified that "'prudential standing is a misnomer' as applied to the zone-of-interests analysis," *Lexmark Int'l, Inc. v. Static Control Components, Inc.*, No. 12-873, 2014 WL 1168967, at *6 (U.S. Mar. 25, 2014) (quoting *Ass'n of Battery Recyclers, Inc. v. EPA*, 716 F.3d 667, 675–76 (D.C. Cir. 2013) (Silberman, J., concurring)). The question remains whether Julander's interest is "arguably within the zone of interests to be protected or regulated by the statute." *Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians v. Patchak*, 132 S. Ct. 2199, 2210 (2012) (quoting *Ass'n of Data Processing*, 397 U.S. at 153).

Although the zone-of-interests test "is not meant to be especially demanding," *Clarke v. Secs. Indus. Ass'n*, 479 U.S. 388, 399 (1987), we conclude that Julander falls outside the zone of interests protected by § 112 of the CAA. Notwithstanding our concurring colleague's suggestion, this conclusion is not the result of a "coin flip" to decide which of our precedents to follow. Concurring Op. at 17, 29. The Supreme Court has instructed that "the breadth of the zone of interests varies according to the provisions of law at issue." *Lexmark*, 2014 WL 1168967, at *8 (citation omitted). Accordingly, this court must be guided by those of our precedents that have interpreted § 112, and not those applying other statutory provisions, including the APA. Those cases hold in the context of challenges to emission standards that competitors of regulated parties fall outside the zone of interests protected by § 112.

In *Association of Battery Recyclers*, 716 F.3d at 674, the court held that a corporation could not chal-

lenge EPA's failure to impose more stringent emission standards on its competitors because that interest fell outside the zone of interests protected by § 112. In *Cement Kiln Recycling Coalition v. EPA*, 255 F.3d 855, 871 (D.C. Cir. 2001), the court similarly held that the purely commercial interests of manufacturers of pollution control equipment seeking more rigorous regulation of their competitors under § 112 were not within the zone of interests that Congress intended to be relied upon to challenge EPA's claimed disregard of the CAA. This was so even though their pecuniary interests in increasing demand for their products were aligned with the goals of the CAA. The court explained that Congress's evident purpose in enacting the CAA was not to compel those sources with less-than-best pollution control to invest in upgraded equipment, but only to meet the standards, as distinct from adopting the methods of emission control, of the best performing sources. *Id.* This court has not read the Supreme Court's decision in *Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians*, 132 S. Ct. 2199, to change the zone-of-interests standard, and the court is bound to follow its own precedent. *See Grocery Mfrs. Ass'n v. EPA*, 693 F.3d 169, 179 (D.C. Cir. 2012); *id.* at 180 (Tatel, J., concurring).

Julander disputes that it is seeking a competitive advantage by increasing the regulatory burden on its competitors, pointing out that as an oil and natural gas development company it is not a direct competitor of the regulated coal- and oil-fired EGUs. It maintains that it is properly characterized as a vendor to, and not a competitor of, the regulated entities. Nonetheless, the reasoning of our binding precedent encompasses Julander's situation. As the court observed in *Hazardous Waste Treatment Council v.*

EPA, 861 F.2d 277, 282 (D.C. Cir. 1988), where the Treatment Council, much like Julander, claimed its interests, although pecuniary, were "in sync" with those sought to be served by the Resource Conservation and Recovery Act, the Supreme Court's standard in *Clarke* "leaves the status of this sort of incidental benefit somewhat unclear." In "find[ing] operational meaning for a test that demands less than a showing of congressional intent to benefit but more than a 'marginal[]rela[tionship]' to the statutory purposes," *id.* at 283 (quoting *Clarke*, 479 U.S. at 399), this court acknowledged that even absent an apparent congressional intent to benefit there may still be "some indicator that the plaintiff is a peculiarly suitable challenger of administrative neglect [to] support[] an inference that Congress would have intended eligibility," *id.* But the court rejected the notion that the petitioner's "in sync" interests were more than "marginally related" to Congress's environmental purposes. *Id.*

> Whenever Congress pursues some goal, it is inevitable that firms capable of advancing that goal may benefit. If Congress authorized bank regulators to mandate physical security measures for banks, for example, a shoal of security services firms might enjoy a profit potential — detective and guard agencies, manufacturers of safes, detection devices and small arms, experts on entrance control, etc. But in the absence of either some explicit evidence of an intent to benefit such firms, or some reason to believe that such firms would be *unusually suitable champions* of Congress's ultimate goals, no one would suppose them to have standing to attack regulatory laxity. And of

> course a rule that gave any such plaintiff standing merely because it happened to be disadvantaged by a particular agency decision would destroy the requirement of prudential standing; any party with constitutional standing could sue.

Id. (emphasis added). In *Cement Kiln*, 255 F.3d at 871, the court embraced this analysis as no less applicable to the CAA. The court has further observed that "judicial intervention may defeat statutory goals if it proceeds at the behest of interests that coincide only accidentally with those goals," *Hazardous Waste*, 861 F.2d at 283, and that "open-ended emissions standards" are particularly susceptible to such "manipulation," *Honeywell Int'l Inc. v. EPA*, 374 F.3d 1363, 1371 (D.C. Cir. 2004).

Ethyl Corp. v. EPA, 306 F.3d 1144 (D.C. Cir. 2002), is of no aid to Julander. In that case, the court held that a manufacturer of fuel additives seeking information (through an open process for testing emissions control systems) in order to comply with its own regulatory obligations fell within the zone of interests protected or regulated by the CAA. *See id.* at 1148. Ethyl had an interest that "appear[ed] congruent with those of the [CAA], *i.e.*, the development of products that will reduce harmful air pollutants," *id.*, without the potential for distortion of the regulatory process of concern to the court in *Hazardous Waste*, 861 F.2d at 285, and *Cement Kiln*, 255 F.3d at 871. Unlike petitioners seeking to increase the regulatory burden on others in order to advance their own commercial interests, Ethyl sought access to information to "improve its products with an eye to conformity to emissions needs" and to "secur[e] EPA approval for

its own fuel additive products under the [Clean Air] Act." *Ethyl Corp.*, 306 F.3d at 1147–48. The court emphasized "the interdependence between motor vehicle certification under the Act (the process at stake here) and fuel regulations (under which Ethyl is a direct regulatee)." *Id.* at 1148. Julander, in contrast, seeks stricter regulation of coal- and oil-fired EGUs, not information that would enable it to comply with its own regulatory obligations.

Julander's suggestion that its interests are properly characterized as those of a vendor, not a competitor, is unavailing. It cannot rely on its existing relationship with natural gas-fired EGUs because they are not subject to the Final Rule, 77 Fed. Reg. at 9309. And claiming that it has standing as a potential vendor to coal- and oil-fired EGUs, in the event they were forced to switch to natural gas, is at odds with the reasoning underlying the vendor-vendee line of cases. A vendor has standing "to assert the interest of [regulated] vendees." *Nat'l Cottonseed Products Ass'n v. Brock*, 825 F.2d 482, 490 (D.C. Cir. 1987) (citing *FAIC Secs., Inc. v. United States*, 768 F.2d 352, 360–61 (D.C. Cir. 1985)). Julander is not standing in for the interests of its potential vendees, which, in fact, here challenge Julander's petition. Consequently, the interests of Julander and the regulated industry petitioners are not "two sides of the same coin." *FAIC Secs.*, 768 F.2d at 359.

Julander had the opportunity to submit its views on fuel switching to EPA during the rulemaking proceedings. And it did. *See* Julander Comments Aug. 4, 2011. It could also have sought permission to appear as amicus in this court, which it did not. Absent any reason to conclude that it is an "unusually suitable

champion[]" of Congress' goals in the CAA, we hold, consistent with this court's precedent, that Julander's interest in increasing the regulatory burden on others falls outside the zone of interests protected by the CAA and therefore Julander may not proceed as a petitioner in this court.

KAVANAUGH, *Circuit Judge*, concurring in part and dissenting in part: Suppose you were the EPA Administrator. You have to decide whether to go forward with a proposed air quality regulation. Your only statutory direction is to decide whether it is "appropriate" to go forward with the regulation. Before making that decision, what information would you want to know? You would certainly want to understand the benefits from the regulations. And you would surely ask how much the regulations would cost. You would no doubt take both of those considerations – benefits and costs – into account in making your decision. That's just common sense and sound government practice.

So it comes as a surprise in this case that EPA excluded any consideration of costs when deciding whether it is "appropriate" – the key statutory term – to impose significant new air quality regulations on the Nation's electric utilities. In my view, it is unreasonable for EPA to exclude consideration of costs in determining whether it is "appropriate" to impose significant new regulations on electric utilities. To be sure, EPA could conclude that the benefits outweigh the costs. But the problem here is that EPA did not even consider the costs. And the costs are huge, about $9.6 billion a year – that's billion with a b – by EPA's own calculation.

In Part I of this opinion, I explain my respectful disagreement with the majority opinion's decision to uphold EPA's exclusion of cost from its decisionmaking under this statutory provision.

In Part II of this opinion, I write to address this Court's case law applying the "zone of interests" test under the Administrative Procedure Act. I accept the

majority opinion's conclusion that petitioner Julander Energy Corporation – a natural gas company challenging EPA's allegedly unlawful under-regulation of Julander's competitor coal and oil companies – does not fall within the "zone of interests" of the Clean Air Act, at least as the zone of interests test has been applied by some decisions of this Court. But those decisions are inconsistent with other decisions of this Court and, more importantly, are incompatible with a 40-year string of Supreme Court decisions applying the "zone of interests" test. Put simply, our case law applying the zone of interests test is in a state of disorder and needs to be cleaned up in the near future.

I

These consolidated cases concern EPA's Final Rule, "National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units," 77 Fed. Reg. 9304 (Feb. 16, 2012). The Rule implements provisions of the Clean Air Act, 42 U.S.C. § 7401 *et seq.*, regarding emissions of hazardous air pollutants.

As the majority opinion recounts, the Clean Air Act originally provided EPA substantial discretion to identify and regulate pollution from sources emitting hazardous air pollutants. That approach proved to be time-consuming and largely unworkable, so in 1990 Congress amended the Act to cabin much of EPA's discretion. The 1990 amendments required EPA to identify stationary sources of 189 enumerated hazardous air pollutants and to adopt standards for limiting emissions of those pollutants from those

sources. *See* 42 U.S.C. § 7412.[1] Those technology-based standards are commonly referred to as the "maximum achievable control technology," or MACT, standards.

EPA uses a two-step process for setting MACT standards. It begins by setting a minimum stringency level, or "floor," based on the performance of the best-performing units in a particular source category. *See id.* § 7412(d)(3). At that first step, EPA may not consider costs. Once the agency sets the statutory floor, it then determines, considering cost and the other factors listed in Section 112(d)(2), whether an even more restrictive standard is "achievable." *Id.* § 7412(d)(2). EPA refers to these stricter requirements as "beyond-the-floor" standards.

The two-step process outlined in Section 112(d) – what I will call the MACT program – applies automatically to most sources of hazardous air pollutants.

But for one category of sources – electric utilities – Congress devised an alternative system as set forth

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[1] Six other common pollutants emitted by stationary sources are regulated under a different section of the Clean Air Act. The National Ambient Air Quality Standards, or NAAQS, prescribe the maximum permissible levels of those six pollutants in the ambient air. *See* 42 U.S.C. § 7409(a)-(b). Under that NAAQS program, EPA must choose levels for emissions of those pollutants which, "allowing an adequate margin of safety, are requisite to protect the public health." *Id.* § 7409(b)(1).

in Section 112(n)(1)(A) of the Act.[2] That alternative system erects two threshold hurdles *before* EPA may regulate electric utilities under the MACT program. *First*, Congress required EPA to "perform a study of the hazards to public health reasonably anticipated to occur as a result of emissions by" electric utilities and report the results of the study to Congress within three years of the enactment of the amendments. *Id.* § 7412(n)(1)(A). *Second*, Congress provided that after the study was completed, EPA could regulate electric utilities under the MACT program only "if the Administrator finds such regulation is *appropriate* and necessary after considering the results of the study." *Id.* (emphasis added).[3]

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[2] The electric utilities included in this alternative system are coal- and oil-fired electric utility steam generating units.

[3] In full, the relevant section of the statute reads: "The Administrator shall perform a study of the hazards to public health reasonably anticipated to occur as a result of emissions by electric utility steam generating units of pollutants listed under subsection (b) of this section after imposition of the requirements of this chapter. The Administrator shall report the results of this study to the Congress within 3 years after November 15, 1990. The Administrator shall develop and describe in the Administrator's report to Congress alternative control strategies for emissions which may warrant regulation under this section. The Administrator shall regulate electric utility steam generating units under this section, if the Administrator finds such regulation is appropriate and necessary after considering the results of the study required by this subparagraph." 42 U.S.C. § 7412(n)(1)(A).

The meaning of Section 112(n)(1)(A) – particularly the term "appropriate" – is a critical question in this litigation. Industry petitioners and EPA dispute whether EPA, when determining whether regulation of electric utilities under the MACT program is "appropriate," must consider the cost to industry and the public from regulating electric utilities under that program.[4]

EPA thinks not. EPA acknowledges that, in the past, it has interpreted and applied the word "appropriate" in this statute to provide for the consideration of costs. *See* 70 Fed. Reg. 15,994, 16,001 & n.19 (Mar. 29, 2005). But the agency has changed its interpretation. EPA's position now is that EPA may reasonably exclude consideration of costs in determining whether it is "appropriate" to regulate electric utilities under the MACT program. The majority opinion upholds EPA's interpretation.

I respectfully disagree with the majority opinion. It is certainly true, as the majority opinion states, that the word "appropriate" is ambiguous in isolation, and that an agency's reasonable interpretation of an ambiguous statutory term is permissible. *See Chevron U.S.A. Inc. v. NRDC*, 467 U.S. 837 (1984). But the agency's answer must be "a permissible construc-

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[4] The other key statutory term in Section 112(n)(1)(A) – "necessary" – is not in dispute. EPA states that regulation of electric utilities is necessary "if the identified or potential hazards to public health or the environment will not be adequately addressed by the imposition of the requirements of" the Clean Air Act. 76 Fed. Reg. 24,976, 24,987 (May 3, 2011).

tion of the statute" – or put another way, the agency's interpretation of the ambiguity must be reasonable. *Id.* at 843. Moreover, under the APA, an agency must consider the relevant factors when exercising its discretion under the governing statute. *See Motor Vehicle Manufacturers Association of the United States, Inc. v. State Farm Mutual Automobile Insurance Co.*, 463 U.S. 29, 42-43 (1983).

In this case, whether one calls it an impermissible interpretation of the term "appropriate" at *Chevron* step one, or an unreasonable interpretation or application of the term "appropriate" at *Chevron* step two, or an unreasonable exercise of agency discretion under *State Farm*, the key point is the same: It is entirely unreasonable for EPA to exclude consideration of costs in determining whether it is "appropriate" to regulate electric utilities under the MACT program.

To begin with, consideration of cost is commonly understood to be a central component of ordinary regulatory analysis, particularly in the context of health, safety, and environmental regulation. And Congress legislated against the backdrop of that common understanding when it enacted this statute in 1990. Put simply, as a matter of common sense, common parlance, and common practice, determining whether it is "appropriate" to regulate requires consideration of costs.

Drawing on his extensive administrative law and regulatory experience, not to mention his experience as a jurist, Justice Breyer has perhaps best explained the centrality of cost consideration to proper regulatory decisionmaking. In order "better to achieve regulatory goals – for example, to allocate resources so that they save more lives or produce a cleaner envi-

ronment – regulators must often take account of all of a proposed regulation's adverse effects." *Whitman v. American Trucking Associations*, 531 U.S. 457, 490 (2001) (Breyer, J., concurring). That is so because "every real choice requires a decisionmaker to weigh advantages against disadvantages, and disadvantages can be seen in terms of (often quantifiable) costs." *Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208, 232 (2009) (opinion of Breyer, J.). Cost is a particularly salient consideration for administrative agencies today, "in an age of limited resources available to deal with grave environmental problems, where too much wasteful expenditure devoted to one problem may well mean considerably fewer resources available to deal effectively with other (perhaps more serious) problems." *Id.* at 233. An "absolute prohibition" on considering costs "would bring about irrational results. . . . [I]t would make no sense to require plants to spend billions to save one more fish or plankton. That is so even if the industry might somehow afford those billions." *Id.* at 232-33 (internal citation and quotation marks omitted).

In addition to Justice Breyer, many other leading jurists and scholars on administrative law have likewise recognized that cost generally has to be a relevant factor in the overall regulatory mix. Consider the following:

- Justice Kagan: "[W]hat does it take in a statute to make us say, look, Congress has demanded that the regulation here occur without any attention to costs? In other words, essentially, Congress has demanded that the regulation has occurred in a fundamentally silly way." Transcript of Oral Argument at 13, *EPA v. EME*

Homer City Generation, L.P., No. 12-1182 (U.S. Dec. 10, 2013).[5]

- Professor Sunstein: "Without some sense of both costs and benefits – both nonmonetized and monetized –regulators will be making a stab in the dark." Cass R. Sunstein, *Cost-Benefit Analysis and the Environment*, ETHICS 351, 354 (2005).
- Professor Sunstein: "A rational system of regulation looks not at the magnitude of the risk alone, but assesses the risk in comparison to the costs." Cass R. Sunstein, *Interpreting Statutes in the Regulatory State*, 103 HARV. L. REV. 405, 493 (1989).
- Professor Sunstein: "[A]ny reasonable judgment will ordinarily be based on some kind of weighing of costs and benefits, not on an inquiry into benefits alone. . . . If the costs would be high and the benefits low, on what rationale should . . . the EPA refuse even to consider the former? There appears to be no good answer. If there is not, the agency's interpretations should be declared unreasonable." Cass R. Sunstein,

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[5] To be clear, I do not read the statutory text at issue in the *EME Homer* case as encompassing costs, at least not in the way EPA argued there. But regardless of how that particular case turns out, the background principle succinctly articulated by Justice Kagan at oral argument reflects the commonsense and well-settled understanding that cost is an essential factor in determining whether it is "appropriate" to regulate.

Cost-Benefit Default Principles, 99 MICH. L. REV. 1651, 1694 (2001).

- Professors Revesz and Livermore: "For certain kinds of governmental programs, the use of cost-benefit analysis is a requirement of basic rationality." RICHARD L. REVESZ & MICHAEL A. LIVERMORE, RETAKING RATIONALITY 12 (2008).
- Professor Pierce: "All individuals and institutions naturally and instinctively consider costs in making any important decision. . . . [I]t is often impossible for a regulatory agency to make a rational decision without considering costs in some way." Richard J. Pierce, Jr., *The Appropriate Role of Costs in Environmental Regulation*, 54 ADMIN. L. REV. 1237, 1247 (2002).

Every presidential administration for more than three decades has likewise made analysis of costs an integral part of the internal Executive Branch regulatory process. *See generally* Helen G. Boutrous, *Regulatory Review in the Obama Administration: Cost-Benefit Analysis for Everyone*, 62 ADMIN. L. REV. 243, 246-48 (2010). Most recently, in 2011, President Obama issued Executive Order 13,563, which follows an earlier Order issued by President Clinton and followed by President George W. Bush. The Order directs each agency "to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible." 76 Fed. Reg. 3821, 3821 (Jan. 21, 2011). Under President Obama's Executive Order, agencies may proceed with proposed regulations only if the benefits justify the costs. *Id.*

To be clear, Congress may itself weigh the costs of a particular kind of regulation, or otherwise take costs out of the equation, when assigning authority to executive and independent agencies to regulate a particular industry or in a particular area. *See Whitman v. American Trucking Associations*, 531 U.S. 457 (2001) (statutory provision does not include consideration of costs). And even when an agency has to take costs into account, it of course may conclude that the benefits of a proposed regulation outweigh the costs. Moreover, different agency heads, and different Presidents, may assess and weigh certain benefits and costs differently depending on their overarching philosophies.

But when considering just as a general matter whether it is "appropriate" to regulate, it is well-accepted that consideration of costs is a central and well-established part of the regulatory decisionmaking process.

But EPA did not consider costs here. And EPA's failure to do so is no trivial matter. The estimated cost of compliance with EPA's Final Rule is approximately $9.6 billion per year, *by EPA's own calculation*. 77 Fed. Reg. at 9306, Table 2. To put it in perspective, that amount would pay the annual health insurance premiums of about two million Americans. It would pay the annual salaries of about 200,000 members of the U.S. Military. It would cover the annual budget of the entire National Park Service three times over. Put simply, the Rule is "among the most expensive rules that EPA has ever promulgated." JAMES E. MCCARTHY, CONGRESSIONAL RESEARCH SERVICE, R42144, EPA'S UTILITY MACT: WILL THE LIGHTS GO OUT? 1 (2012).

EPA calculated the $9.6 billion cost figure as part of its Regulatory Impact Analysis accompanying the Rule. That Regulatory Impact Analysis was required by President Obama's Executive Order. Yet EPA's official position in this Court is that the costs identified in the Regulatory Impact Analysis should have "no bearing on" the determination of whether regulation is appropriate. EPA Br. 55.

On the other side of the ledger, the benefits of this Rule are disputed: Industry petitioners focus on the reduction in hazardous air pollutant emissions attributable to the regulations, which amount to only $4 to $6 million dollars each year. *See* 77 Fed. Reg. at 9428; State, Industry & Labor Br. 21. If those figures are right, the Rule costs nearly $1,500 for every $1 of health and environmental benefit produced. For its part, EPA says it would estimate the benefits at $37 to $90 billion dollars based on what it says are the indirect benefits of reducing $PM_{2.5}$, a type of fine particulate matter that is not itself regulated as a hazardous air pollutant. *See* 77 Fed. Reg. at 9428.

To be sure, as I have said, EPA may be able to conclude that the benefits outweigh the costs in determining whether it is "appropriate" to regulate electric utilities under the MACT program. But to reiterate, that's not what EPA has done in this Rule. Rather, according to EPA, *it is irrelevant how large the costs are or whether the benefits outweigh the costs in determining whether it is "appropriate" to regulate electric utilities under the MACT program.*

In response to petitioners' claim that the legal issue here has huge real-world consequences, the majority opinion suggests that it may not matter all that much that EPA refused to consider costs in deciding

whether it is "appropriate" to regulate electric utilities under the MACT program, because EPA does account for costs in the *second* step of the MACT program, when EPA sets "beyond-the-floor" standards. Maj. Op. at 24. I respectfully find that to be a red herring. After all, once EPA determines that it is appropriate to regulate electric utilities under the MACT program, costs are not relevant at the *first*, "setting the floor" stage of the MACT program. And meeting that floor will be prohibitively expensive, particularly for many coal-fired electric utilities, regardless of whether EPA decides to go further and set a "beyond-the-floor" standard. So in the real world in which electric utilities operate, the financial burden of complying with that *first* "setting the floor" step of the MACT program –where costs are not considered – will likely knock a bunch of coal-fired electric utilities out of business and require enormous expenditures by other coal and oil-fired electric utilities. Telling someone that costs will be considered in a regulatory step that occurs *after* they have already had to pay an exorbitant amount and may already have been put out of business is not especially reassuring. The majority opinion's attempt to downplay the effects of its decision thus rings a bit hollow.

In downplaying the issue here, the majority opinion also says that the result of this case is that electric utilities will just be treated like other sources. In saying that, the majority opinion, in my respectful view, does not sufficiently account for the fact that treating electric utilities differently from standard sources was the intent of Section 112(n)(1)(A), as revealed by the statutory text. If Congress had intended EPA to consider the costs of regulating electric utilities only when deciding whether to adopt beyond-

the-floor standards, and not as a threshold decision in deciding whether to regulate electric utilities under the MACT program to begin with, it would have done one of two things: It would have either automatically regulated electric utilities under the MACT program, as it did with other sources, or provided that regulation under the MACT program would be automatic if the three-year study found that these sources indeed emitted hazardous air pollutants. That Congress declined to choose either of those options, and instead directed EPA to regulate electric utilities under the MACT program only if "appropriate," reinforces the conclusion that Congress intended EPA to consider costs in deciding whether to regulate electric utilities at the threshold, and not simply at the second beyond-the-floor stage of the MACT program.

Not only does EPA's approach depart from the clear statutory scheme, standard agency decisionmaking, and the common understanding of the term "appropriate" in this regulatory context, it also effectively negates the congressional compromise that was ultimately embodied in the statutory text of the 1990 Act. Under the initial Senate proposal, electric utilities would been have listed as sources under Section 112(c) and therefore automatically regulated under Section 112(d), the MACT program. *See* 3 A LEGISLATIVE HISTORY OF THE CLEAN AIR ACT AMENDMENTS OF 1990, at 4119, 4418-28 (1993). But the House subsequently modified the Senate bill to make regulation of electric utilities under the MACT program dependent on the results of a study and the Administrator's subsequent determination that regulation was "appropriate" and necessary. *See* 2 *id.* at 2148-49. In the words of the House bill's legislative

sponsor, Congressman Oxley, the goal of the counter-proposal was to provide "protection of the public health *while avoiding the imposition of excessive and unnecessary costs on residential, industrial, and commercial consumers of electricity*." *See* 1 *id.* at 1417 (emphasis added). The House's proposal ultimately prevailed with the Conference Committee "because of . . . the extremely high costs that electric utilities will face under other provisions of the new Clean Air Act amendments." *Id.* at 1416. That Conference Committee view – that EPA should avoid imposing unwarranted financial burdens when deciding to regulate electric utilities – is encapsulated in the textual directive that EPA regulate electric utilities under the MACT program only if "appropriate."

The majority opinion here says that the term "appropriate" is ambiguous. But the Supreme Court often looks to legislative history to help inform interpretation of otherwise ambiguous statutes, including in *Chevron* cases. *See Chevron* 467 U.S. at 843 n.9. And here, the legislative history should resolve any lingering ambiguity on the key point of what "appropriate" encompasses. It establishes that Congress in 1990 chose to impose these threshold requirements on EPA specifically because it wanted EPA to consider costs *before* regulating electric utilities under the MACT program. EPA's interpretation of Section 112(n)(1)(A) in this case upsets Congress's careful balance and stacks the deck in favor of regulation of electric utilities under the MACT program. In effect, EPA's reading of the statute replaces its authority to regulate electric utilities if "appropriate" with a command to regulate electric utilities under the MACT program regardless of costs. That is not what

Congress intended or permitted and thus is beyond EPA's authority. *See Chevron*, 467 U.S. at 843 n.9.

In upholding EPA's cost-blind approach, the majority opinion points to other statutory provisions that expressly reference cost and invokes the familiar interpretive canon that "[w]here Congress includes particular language in one section of a statute but omits it in another section of the same Act, it is generally presumed that Congress acts intentionally and purposely in the disparate inclusion or exclusion." *Russello v. United States*, 464 U.S. 16, 23 (1983). The majority opinion assigns particular weight to the Supreme Court's decision in *Whitman v. American Trucking Associations*, 531 U.S. 457 (2001), which referenced that canon when construing a different section of the Clean Air Act. *See Whitman*, 531 U.S. at 467 ("We have therefore refused to find implicit in ambiguous sections of the CAA an authorization to consider costs that has elsewhere, and so often, been expressly granted."). As in *Whitman*, according to the majority opinion, Congress's decision not to explicitly mention cost in Section 112(n)(1)(A), despite doing so in other parts of the Act, creates a negative implication that costs are an unnecessary consideration.

But I respectfully believe the majority opinion is misreading – or at least over-reading – *Whitman*. *Whitman* was a textualist decision written for a unanimous Court by Justice Scalia. It stands for the basic proposition that consideration of costs cannot be jammed into a statutory factor that, by its terms, otherwise would not encompass "costs," particularly when other provisions of the Act expressly reference costs. *See Entergy*, 556 U.S. at 223 (*Whitman* "stands for the rather unremarkable proposition that some-

times statutory silence, when viewed in context, is best interpreted as limiting agency discretion.").

In *Whitman* itself, the statutory factor was a provision of the Clean Air Act, Section 109(b)(1), that directed EPA to set ambient air quality standards at levels "requisite to protect the public health" with "an adequate margin of safety." 42 U.S.C. § 7409(b)(1). The dispute concerned whether those "modest words" granted EPA "the power to determine whether implementation costs should moderate national air quality standards." 531 U.S. at 468. Concluding that EPA had not been granted such power, the Court speaking through Justice Scalia observed that cost "is *both* so indirectly related to public health *and* so full of potential for canceling the conclusions drawn from direct health effects that it would surely have been expressly mentioned in §§ 108 and 109 had Congress meant it to be considered." *Id.* at 469.

The statutory provision at issue in *Whitman* differs significantly from the statute at issue here. The statutory provision in *Whitman* tied regulation solely to "public health," which is typically a critical factor *on the other side of the balance* from costs, not a factor that includes costs. Here, by contrast, the key statutory term is "appropriate" – the classic broad and all-encompassing term that naturally and traditionally includes consideration of all the relevant factors, health and safety benefits on the one hand and costs on the other. To unblinkingly rely on *Whitman* here is to overlook the distinct language of the relevant statutes. *Cf. Michigan v. EPA*, 213 F.3d 663, 677-79 (D.C. Cir. 2000) (the term "significant" "does not in itself convey a thought that significance should

be measured in only one dimension," and in "some contexts, 'significant' begs a consideration of costs").

To sum up: All significant regulations involve tradeoffs, and I am very mindful that Congress has assigned EPA, not the courts, to make many discretionary calls to protect both our country's environment and its productive capacity. In this case, if EPA had decided, in an exercise of its judgment, that it was "appropriate" to regulate electric utilities under the MACT program because the benefits outweigh the costs, that decision would be reviewed under a deferential arbitrary and capricious standard of review. *See American Radio Relay League, Inc. v. FCC*, 524 F.3d 227, 247-48 (D.C. Cir. 2008) (separate opinion of Kavanaugh, J.). But before we assess the merits of any cost-benefit balancing, this statutory scheme requires that we first ensure that EPA has actually considered the costs. *See State Farm*, 463 U.S. at 42-43. In my view, whether we call it a *Chevron* problem or a *State Farm* problem, it is unreasonable for EPA to exclude consideration of costs when deciding whether it is "appropriate" to regulate electric utilities under the MACT program. I respectfully dissent from the majority opinion's contrary conclusion.[6]

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[6] On the *Chevron* point, I add one further comment. When the Government wins a *Chevron* case, it may prevail at *Chevron* step one (because the agency's interpretation of the statute is mandated by the statutory language) or at *Chevron* step two (because the agency's interpretation of an ambiguous statute is at least reasonable). In those cases, the step one or step two label may have practical significance, as it may determine whether the agency

II

This case implicates another important administrative law issue, the "zone of interests" test under the Administrative Procedure Act.[7] The Court holds that petitioner Julander Energy Company falls outside the "zone of interests" the Clean Air Act is designed to protect and thus cannot challenge the Final Rule. The Court reasons that the concerns raised by Julander, a natural gas production company, are merely to seek more stringent regulation of its coal and oil company competitors. *See* Maj. Op. at 57-58.

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could try to adopt a contrary interpretation in the future. On the other hand, when the agency loses a *Chevron* case because the agency has adopted an interpretation outside the permissible bounds of the statute, even after reading relevant ambiguities in the agency's favor, there is not much if any practical difference for purposes of future agency action whether we label our decision as *Chevron* step one or *Chevron* step two. *See generally City of Arlington v. FCC*, 133 S. Ct. 1863, 1868, 1874 (2013). So it is here, in my view.

[7] This Court has traditionally referred to the zone of interests test as a component of "prudential standing." As the Supreme Court has recently explained, however, the test does not belong under the "prudential" rubric. *Lexmark International, Inc. v. Static Control Components, Inc.*, No. 12-873 (U.S. Mar. 25, 2014). Instead, whether a plaintiff comes with the "zone of interests" is a statutory question "that requires us to determine, using traditional tools of statutory interpretation, whether a legislatively conferred cause of action encompasses a particular plaintiff's claim." *Id.*, slip op. at 8.

I reluctantly join that portion of the Court's opinion because it is consistent with *some* of this Court's previous decisions applying the zone of interests test. I hasten to add that the decisions on which the Court today relies are inconsistent with other of this Court's precedents. Given that our case law makes this issue a de facto coin flip, I cannot fault an opinion that lands on heads rather than tails.

I am concerned, however, about the erratic inconsistency in our case law. I am even more concerned that our cases holding that competitors are outside the zone of interests –including today's decision – are inconsistent with the governing Supreme Court precedents. I write separately to explain my concerns.

The Supreme Court first announced the APA "zone of interests" test in *Association of Data Processing Service Organizations, Inc. v. Camp*, 397 U.S. 150 (1970) (*Data Processing*). In that case, vendors of data processing services challenged the Comptroller of the Currency's decision to allow competitor national banks to sell the same services. The data processing vendors alleged that the agency decision violated a provision of the National Bank Act. The district court dismissed the case for lack of standing, and the court of appeals affirmed the dismissal. The Supreme Court reversed. For purposes of Article III standing, the Court first said that there was "no doubt" that the petitioners had alleged a sufficient "injury in fact." *Id.* at 152. In reaching that conclusion, the Court rejected the then-prevailing requirement that plaintiffs show that a defendant's actions invaded a "legal interest" belonging to the plaintiff. *Id.* at 153. The Court instead adopted the now-familiar "injury in fact" test.

For purposes of the APA, the Court added that the separate question of being able to sue under the APA "concerns, apart from the 'case' or 'controversy' test, the question whether the interest sought to be protected by the complainant is arguably within the zone of interests to be protected or regulated by the statute or constitutional guarantee in question." *Id.* And the Court said that the "zone of interests" requirement was satisfied by the plaintiffs in *Data Processing*, who were competitors of the national banks. The Court noted with approval the "trend . . . toward enlargement of the class of people who may protest administrative action." *Id.* at 154. In keeping with that trend, the Court refused to take an overly restrictive view of "the generous review provisions" of the APA, which the Court noted should be construed "not grudgingly but as serving a broadly remedial purpose." *Id.* at 156.[8]

The Supreme Court reaffirmed its broad understanding of the zone of interests test in *Arnold Tours, Inc. v. Camp*, 400 U.S. 45 (1970) and *Investment Company Institute v. Camp*, 401 U.S. 617 (1971). The plaintiffs in both cases were competitors of national banks. Both cases concerned decisions by the Comp-

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[8] Although *Data Processing* referenced the Administrative Procedure Act, the opinion did not explicitly tie the zone of interests test to the text of the APA. The Court subsequently clarified that the zone of interests test is a "gloss" on Section 702 of the APA, which grants the right to judicial review of an agency action to any person "adversely affected or aggrieved" by that action. *See Clarke v. Securities Industry Association*, 479 U.S. 388, 395, 400 n.16 (1987).

troller of the Currency to authorize national banks to offer new services to customers: travel services in *Arnold Tours* and investment services in *Investment Company Institute*. And in both cases, the Court held that plaintiffs who would have to compete with the banks under the new regulations satisfied the zone of interests test and could challenge the Comptroller's decision. *See Arnold Tours*, 400 U.S. at 46; *Investment Company Institute*, 401 U.S. at 620-21.

Notably, Justice Harlan dissented in *Investment Company Institute* because there was no evidence of "any congressional concern for the interests of petitioners and others like them in freedom from competition." *Investment Company Institute*, 401 U.S. at 640 (Harlan, J., dissenting). But that fact, the Court held, was not fatal to the plaintiffs' case; it was enough to satisfy the zone of interests test that Congress, for its own reasons, "did legislate against the competition that the petitioners challenge." *Id.* at 621 (majority opinion).

Thus, at the time of its inception, the zone of interests test was understood to be part of a broader trend toward *expanding* the class of persons able to bring suits under the APA challenging agency actions. *See Copper & Brass Fabricators Council, Inc. v. Department of the Treasury*, 679 F.2d 951, 953 n.2 (D.C. Cir. 1982) (R.B. Ginsburg, J., concurring) (in each of the Supreme Court's first four zone of interests decisions, the Court "utilized the 'zone' test to reverse lower court decisions which had held that the respective plaintiffs lacked standing"). Although the Supreme Court was cognizant of the dangers of freely permitting judicial review of agency decisions, it nonetheless "struck the balance in a manner favoring

review," as the Court later described it, excluding only "those would-be plaintiffs not even arguably within the zone of interests to be protected or regulated by the statute." *Clarke v. Securities Industry Association*, 479 U.S. 388, 397 (1987) (internal quotation marks omitted).

And importantly for present purposes, the Supreme Court in those early zone of interest cases specifically held that the class of persons who could sue specifically included plaintiffs who were complaining about what they alleged was unlawfully lax agency regulation of the plaintiffs' competitors. The theory was simple: Competitors, almost by definition, are among the class of people "arguably" to be "protected" when Congress limited the activities of other competitors in the relevant industry. So absent a discernible congressional intent *to preclude suit* by the plaintiffs, the suit could proceed.

In the years following *Data Processing*, however, this Court appeared to resist the Supreme Court's direction on competitor suits under the zone of interests test. This Court's cases still said, for example, that the zone of interests test required "some indicia – however slight – that the litigant before the court was intended to be protected" by the statute providing a cause of action. *See, e.g., Copper & Brass Fabricators*, 679 F.2d at 952 (majority opinion).

In *Clarke v. Securities Industry Association*, 479 U.S. 388 (1987), however, the Supreme Court reaffirmed that it meant what it said in *Data Processing*. And the Court in *Clarke explicitly* stated that D.C. Circuit cases had incorrectly departed from *Data Processing*. *See id.* at 400 n.15.

Clarke was another case in which some plaintiffs argued that the Comptroller of the Currency's regulation of the plaintiffs' competitors was unduly lax. Specifically, securities brokers challenged the Comptroller's decision to exempt certain bank offices that offered brokerage services from restrictions on branch banking. The Court began its analysis by clarifying that although the zone of interests test was "basically one of interpreting congressional intent," the inquiry did *not* require a congressional intent to benefit the plaintiff class. *Clarke*, 479 U.S. at 394, 399-400. Rather, suits would be allowed unless a "congressional intent to preclude review" in suits by the plaintiffs was "fairly discernible." *Id.* at 403 (citing *Block v. Community Nutrition Institute*, 467 U.S. 340, 351 (1984)) (internal quotation marks omitted). The zone of interests test "is a guide for deciding whether, in view of Congress' evident intent to make agency action presumptively reviewable, a particular plaintiff should be heard to complain of a particular agency decision. In cases where the plaintiff is not itself the subject of the contested regulatory action, the test denies a right of review if the plaintiff's interests are so marginally related to or inconsistent with the purposes implicit in the statute that it cannot reasonably be assumed that Congress intended to permit the suit. The test is not meant to be especially demanding." *Id.* at 399.

In sum, *Clarke* confirmed the capacious view of the zone of interests requirement announced in *Data Processing* and similar cases. It reaffirmed the presumption in favor of allowing suit and made clear that the suit should be allowed unless the statute evinces discernible congressional intent to preclude review. *See* 3 RICHARD J. PIERCE, JR.,

ADMINISTRATIVE LAW TREATISE § 16.9, at 1521 (5th ed. 2010) ("An injured plaintiff has standing under the APA unless Congress intended to preclude judicial review at the behest of parties in plaintiff's class.").

And most importantly for our purposes, *Clarke* confirmed that competitors were presumptively within the zone of interests under the APA when challenging allegedly lax regulation of other competitors in the relevant industry, absent discernible evidence of contrary congressional intent. *See id.* at 403 ("competitors who allege an injury that implicates the policies of the National Bank Act are very reasonable candidates to seek review of the Comptroller's rulings").

As one respected commentator has summarized the Supreme Court's case law: "It is hardly a caricature to say that the current law is this: Businesses desiring to complain that the government is regulating their competitors with insufficient stringency are *invariably and automatically* held to fall within the zone of interests of any allegedly violated statute . . . ." Jonathan R. Siegel, *Zone of Interests*, 92 GEO. L.J. 317, 347 (2004) (emphasis added).

Despite the apparent clarity of *Clarke* – and its explicit disapproval of this Court's zone of interests cases – some of this Court's post-*Clarke* decisions nonetheless still have barred competitors from suing because they are purportedly outside the zone of interests. For example, in *Hazardous Waste Treatment Council v. EPA*, 861 F.2d 277 (D.C. Cir. 1988) – a case on which the Court today relies – we considered a claim by waste treatment companies that EPA's waste disposal standards were unduly lax toward

some competitors of the waste treatment companies. *Id.* at 283. As I read the cases, *Clarke*, *Data Processing*, *Investment Company*, and *Arnold Tours* had contemplated that the zone of interests test would be satisfied in such a scenario. Nevertheless, in *Hazardous Waste*, we held that the plaintiffs did not fall within the zone of interests "in the absence of either some explicit evidence of an intent to benefit such firms, or some reason to believe that such firms would be unusually suitable champions of Congress's ultimate goals." *Hazardous Waste*, 861 F.2d at 283.

In my view, that language in *Hazardous Waste* is difficult to square with what the Supreme Court said in *Clarke* and earlier cases.[9] In those cases, the Supreme Court had specifically said that there does *not* need to be evidence of an intent to benefit the plaintiff class. In fact, the Supreme Court said that suit should be allowed unless there was a discernible congressional intent *to preclude suit* by the plaintiff class. In other words, this Court's cases seemingly flipped the presumption in favor of allowing suit by competitor plaintiffs to a presumption against allowing suit by competitor plaintiffs.

The confusion in our case law has only grown in the years following *Hazardous Waste*. Sometimes we allow competitors to sue, opining, for example, that we "take from" cases like *Clarke* "the principle that a plaintiff who has a competitive interest in confining a regulated industry within certain congressionally

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[9] Chief Judge Wald stated as much at the time. *See Hazardous Waste Treatment Council v. Thomas*, 885 F.2d 918, 931 (D.C. Cir. 1989) (Wald, C.J., dissenting).

imposed limitations may sue to prevent the alleged loosening of those restrictions." *First National Bank & Trust Co. v. National Credit Union Administration*, 988 F.2d 1272, 1277 (D.C. Cir. 1993); *see, e.g.*, *Sherley v. Sebelius*, 610 F.3d 69, 75 (D.C. Cir. 2010) (allowing doctors to sue because of allegedly illegal agency under-regulation of other doctors: "Because the Act can plausibly be interpreted to limit research involving" embryonic stem cells, "the Doctors' interest in preventing the NIH from funding such research is not inconsistent with the purposes of the Amendment. . . . [T]hat is all that matters."); *Honeywell International Inc. v. EPA*, 374 F.3d 1363, 1370 (D.C. Cir. 2004) (allowing chemical manufacturer to sue because of allegedly illegal agency under-regulation of competing chemicals: "If there is reason to believe that a party's interest in statutory enforcement will advance, rather than hinder, the operation of a statute, the court can reasonably assume that Congress intended to permit the suit."); *Ethyl Corp. v. EPA*, 306 F.3d 1144, 1148 (D.C. Cir. 2002) (allowing manufacturer of fuel additives to sue because of allegedly illegal under-regulation of automobile manufacturers: zone of interests "includes not only those challengers expressly mentioned by Congress, but also unmentioned potential challengers that Congress would have thought useful for the statute's purpose"); *Wabash Valley Power Association, Inc. v. FERC*, 268 F.3d 1105, 1112 (D.C. Cir. 2001) (allowing power association to sue because of allegedly illegal under-regulation of merging utility companies: "In this case, as a competitor crying foul, Wabash satisfies prudential standing requirements."); *Mova Pharmaceutical Corp. v. Shalala*, 140 F.3d 1060, 1076 (D.C. Cir. 1998) (allowing drug manufacturer to sue because of

allegedly illegal agency under-regulation of other drug manufacturer: "Upjohn's interest in limiting competition for its product is, by its very nature, linked with the statute's goal of limiting competition between generic manufacturers.") (internal citation and quotation marks omitted); *see also Amgen, Inc. v. Smith*, 357 F.3d 103, 109 (D.C. Cir. 2004) ("Parties motivated by purely commercial interests routinely satisfy the zone of interests test under this court's precedents.").

But other times, as in *Hazardous Waste*, we say exactly the opposite, that competitors are not within the zone of interests and are barred from suing. *See, e.g., Association of Battery Recyclers, Inc. v. EPA*, 716 F.3d 667, 674 (D.C. Cir. 2013) (lead smelter could not object to lax regulation of other lead smelters: plaintiff objected "not to any regulatory burden imposed on it but instead to the absence of regulatory burdens imposed on its competitors"); *Grocery Manufacturers Association v. EPA*, 693 F.3d 169, 179 (D.C. Cir. 2012) (food producers could not object to lax regulation of ethanol producers who compete with food producers in market to purchase corn);[10] *Cement Kiln Recycling Coalition v. EPA*, 255 F.3d 855, 871 (D.C. Cir. 2001) (hazardous waste combustors could not ob-

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[10] In *Grocery Manufacturers Association v. EPA*, 693 F.3d 169 (D.C. Cir. 2012), we addressed an additional question of whether the zone of interests test is a jurisdictional requirement. The Supreme Court has since made clear that the zone of interests test is not jurisdictional. *See Lexmark International, Inc. v. Static Control Components, Inc.*, No. 12-873, slip op. at 9 n.4 (U.S. Mar. 25, 2014).

ject to lax regulation of competing combustors: "the Council's interest lies only in increasing the regulatory burden on others"); *ANR Pipeline Co. v. FERC*, 205 F.3d 403, 408 (D.C. Cir. 2000) (natural gas pipeline operator could not object to lax regulation of competitor's pipeline: plaintiff's "only concern is with suppressing competition from Nautilus, and that economic interest is not within the zone of interests protected by NEPA"); *Liquid Carbonic Industries Corp. v. FERC*, 29 F.3d 697, 705 (D.C. Cir. 1994) (industrial gas corporation could not object to lax regulation of competitor's facilities: "There being no indication that Congress intended to benefit a second-tier competitor, Liquid Carbonic does not have standing as an intended beneficiary.").

Those competing lines of cases have developed without any apparent distinguishing principle. Having carefully reviewed all of them together in one sitting, I frankly cannot find a clear line to separate the cases where we have found competitors to be within the zone of interests from the cases where we have not.

Moreover, there is nothing in the Clean Air Act that poses a stricter limit on competitor suits than in APA cases involving other statutes. The default rule set forth by the Supreme Court for APA cases is that competitors may sue, unless the substantive statute at issue excludes such suits. Nothing in the Clean Air Act indicates an intent to exclude competitor suits. And it is surely not incongruent with the Clean Air Act to allow competitor suits. By definition, a successful competitor suit would mean that the source would have to comply with stricter Clean Air Act limits. Put simply: Allowing competitor suits in Clean

Air Act cases will mean cleaner air. Excluding competitor suits in Clean Air Act cases will mean dirtier air.

Apart from our case law's internal inconsistency, the larger problem, as I see it, is that the line of cases in this Court that have held that competitors are outside the zone of interests is out of step with the Supreme Court's case law from *Data Processing* to *Clarke*. What is more, the Supreme Court's cases since *Clarke* have only reinforced the broad conception set forth in *Data Processing* and *Clarke*. *See, e.g.*, *National Credit Union Administration v. First National Bank & Trust Co.*, 522 U.S. 479, 493-94 (1998) ("As competitors of federal credit unions, respondents certainly have an interest in limiting the markets that federal credit unions can serve, and the NCUA's interpretation has affected that interest by allowing federal credit unions to increase their customer base."); *see also Air Courier Conference of America v. American Postal Workers Union, AFL-CIO*, 498 U.S. 517, 529 (1991) ("*Clarke* is the most recent in a series of cases in which we have held that competitors of regulated entities have standing to challenge regulations."); *Lexmark International, Inc. v. Static Control Components, Inc.*, No. 12-873, slip op. at 11 (U.S. Mar. 25, 2014) (a "lenient approach" to the zone of interests test "is an appropriate means of preserving the flexibility of the APA's omnibus judicialreview provision, which permits suit for violations of numerous statutes of varying character that do not themselves include causes of action for judicial review").

Among the Supreme Court's post-*Clarke* decisions is *Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians v. Patchak*, 132 S. Ct. 2199 (2012). Although

not a competitor case, the reasoning of *Match-E* reinforces *Data Processing* and *Clarke*, and reaffirms the Supreme Court's broad conception of the zone of interests under the APA.

Writing for the Court in *Match-E*, Justice Kagan reiterated that the zone of interests requirement is a low bar: The test "is not meant to be especially demanding. We apply the test in keeping with Congress's evident intent when enacting the APA to make agency action presumptively reviewable. *We do not require any indication of congressional purpose to benefit the would-be plaintiff.* And we have always conspicuously included the word 'arguably' in the test to indicate that the benefit of any doubt goes to the plaintiff. The test forecloses suit only when a plaintiff's interests are so marginally related to or inconsistent with the purposes implicit in the statute that it cannot reasonably be assumed that Congress intended to permit the suit." *Id.* at 2210 (emphasis added) (footnote, citation, and some internal quotation marks omitted).

Match-E reaffirmed – in line with *Data Processing* and *Clarke* – that the plaintiff need not be among a class that Congress intended to benefit in the statute at hand. And *Match-E* further reaffirmed that a wide variety of interests, including economic interests related to the agency's allegedly unlawful action with respect to *someone else*, fall within the zone of interests. There, a residential property owner claimed that the Interior Department violated federal law when it acquired a parcel of land for use by a nearby Indian tribe as a casino. *See id.* at 2202-03. All agreed that the federal statute was not designed to benefit a property owner who objects when the Fed-

eral Government acquires another property owner's land in order to help Indians. *See id.* at 2210 n.7. The Supreme Court nonetheless concluded that the zone of interests test was satisfied. The Supreme Court said that "neighbors to the use (like Patchak) are reasonable – indeed, predictable – challengers of the Secretary's decisions: Their interests, *whether economic, environmental, or aesthetic*, come within § 465's regulatory ambit." *Id.* at 2212 (emphasis added).

Given its music and its words, *Match-E* should have put a final end to this Court's crabbed approach to the zone of interests test. But our Court has still continued since *Match-E* to hold – at least in some cases – that the zone of interests test prevents businesses from complaining about allegedly illegal agency under-regulation of their competitor businesses. *See, e.g.*, *Association of Battery Recyclers*, 716 F.3d at 674; *Grocery Manufacturers Association*, 693 F.3d at 179.

Put simply, our current zone of interests case law is inconsistent and unpredictable. Perhaps most troubling, our cases holding that competitors are outside the zone of interests are inconsistent with Supreme Court precedent, as I read it. In my respectful view, too much is at stake in the administrative process, for health, safety, and environmental regulation, and for the economic interests affected by these cases for us to continue muddling along in this way. This state of affairs should receive a careful examination at some point in the near future. Whether a party can sue in court to challenge illegal agency action on such important matters should not come down to the equivalent of a coin flip. We can do better.

* * *

I respectfully dissent from the majority opinion's conclusion that EPA may reasonably exclude consideration of costs when deciding whether it is appropriate to regulate electric utilities under the MACT program. And on the zone of interests test, I accept the majority opinion's conclusion that Julander falls outside the zone of interests, at least under some of our precedents. But in my view, those precedents are not consistent with other decisions of this Court or with the Supreme Court's case law and should be corrected in due course.

APPENDIX C

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 60 and 63

[EPA–HQ–OAR–2009–0234; EPA-HQ-OAR-2011-0044, FRL–9611–4]

RIN 2060–AP52; RIN 2060–AR31

National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units

AGENCY: Environmental Protection Agency (EPA).
ACTION: Final rule.

SUMMARY: On May 3, 2011, under authority of Clean Air Act (CAA) sections 111 and 112, the EPA proposed both national emission standards for hazardous air pollutants (NESHAP) from coal- and oil-fired electric utility steam generating units (EGUs) and standards of performance for fossil-fuel-fired electric utility, industrial-commercial-institutional, and small industrial-commercial-institutional steam generating units (76 FR 24976). After consideration of public comments, the EPA is finalizing these rules in this action.

Pursuant to CAA section 111, the EPA is revising standards of performance in response to a voluntary remand of a final rule. Specifically, we are amending new source performance standards (NSPS) after analysis of the public comments we received. We are also finalizing several minor amendments, technical clarifications, and corrections to existing NSPS provisions for fossil fuel-fired EGUs and large and small industrial-commercial-institutional steam generating units.

Pursuant to CAA section 112, the EPA is establishing NESHAP that will require coal- and oil-fired EGUs to meet hazardous air pollutant (HAP) standards reflecting the application of the maximum achievable control technology. This rule protects air quality and promotes public health by reducing emissions of the HAP listed in CAA section 112(b)(1).

DATES: This final rule is effective on April 16, 2012. The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register as of April 16, 2012.

ADDRESSES: The EPA established two dockets for this action: Docket ID. No. EPA–HQ–OAR–2011–0044 (NSPS action) or Docket ID No. EPA–HQ–OAR–2009–0234 (NESHAP action). All documents in the dockets are listed on the *http://www.regulations.gov* Web site. Although listed in the index, some information is not publicly available, e.g., confidential business information or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either elec-

tronically through *http://www.regulations.gov* or in hard copy at EPA's Docket Center, Public Reading Room, EPA West Building, Room 3334, 1301 Constitution Avenue NW., Washington, DC 20004. This Docket Facility is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566–1741.

FOR FURTHER INFORMATION CONTACT: For the NESHAP action: Mr. William Maxwell, Energy Strategies Group, Sector Policies and Programs Division, (D243–01), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; Telephone number: (919) 541–5430; Fax number (919) 541–5450; Email address: *maxwell.bill@epa.gov*. For the NSPS action: Mr. Christian Fellner, Energy Strategies Group, Sector Policies and Programs Division, (D243–01), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; Telephone number: (919) 541–4003; Fax number (919) 541–5450; Email address: *fellner.christian@epa.gov*.

SUPPLEMENTARY INFORMATION:

The information presented in this preamble is organized as follows:

I. General Information
  A. Does this action apply to me?
  B. Where can I get a copy of this document?
  C. Judicial Review
  D. What are the costs and benefits of these final rules?

II. Background Information on the NESHAP
A. What is the statutory authority for this final NESHAP?
B. What is the litigation history of this final rule?
C. What is the relationship between this final rule and other combustion rules?
D. What are the health effects of pollutants emitted from coal- and oil-fired EGUs?
III. Appropriate and Necessary Finding
A. Overview
B. Peer Review of the Hg Risk TSD Supporting the Appropriate and Necessary Finding for Coal and Oil-Fired EGUs and EPA Response
C. Summary of Results of Revised Hg Risk TSD of Risks to Populations With High Levels of Self-Caught Fish Consumption
D. Peer Review of the Approach for Estimating Cancer Risks Associated With Cr and Ni Emissions in the U.S. EGU Case Studies of Cancer and Non-Cancer Inhalation Risks for Non-Mercury Hg HAP and EPA Response
E. Summary of Results of Revised U.S. EGU Case Studies of Cancer and Non-Cancer Inhalation Risks for Non-Mercury Hg HAP
F. Public Comments and Responses to the Appropriate and Necessary Finding
G. EPA Affirms the Finding That It Is Appropriate and Necessary To Regulate EGUs To Address Public Health and Environmental Hazards Associated With Emissions of Hg and Non-Mercury Hg HAP From EGUs
IV. Denial of Delisting Petition

A. Requirements of Section 112(c)(9)
B. Rationale for Denying UARG's Delisting Petition
C. EPA's Technical Analyses for the Appropriate and Necessary Finding Provide Further Support for the Conclusion That Coal-Fired EGUs Should Remain a Listed Source Category
V. Summary of the Final NESHAP
A. What is the source category regulated by this final rule?
B. What is the affected source?
C. What are the pollutants regulated by this final rule?
D. What emission limits and work practice standards must I meet?
E. What are the requirements during periods of startup, shutdown, and malfunction?
F. What are the testing and initial compliance requirements?
G. What are the continuous compliance requirements?
H. What are the notification, recordkeeping and reporting requirements?
I. Submission of Emissions Test Results to the EPA
VI. Summary of Significant Changes Since Proposal
A. Applicability
B. Subcategories
C. Emission Limits
D. Work Practice Standards for Organic HAP Emissions
E. Requirements During Startup, Shutdown, and Malfunction

F. Testing and Initial Compliance
G. Continuous Compliance
H. Emissions Averaging
I. Notification, Recordkeeping and Reporting
J. Technical/Editorial Corrections
VII. Public Comments and Responses to the Proposed NESHAP
A. MACT Floor Analysis
B. Rationale for Subcategories
C. Surrogacy
D. Area Sources
E. Health-Based Emission Limits
F. Compliance Date and Reliability Issues
G. Cost and Technology Basis Issues
H. Testing and Monitoring
VIII. Background Information on the NSPS
A. What is the statutory authority for this final NSPS?
B. What is the regulatory authority for the final rule?
IX. Summary of the Final NSPS
X. Summary of Significant Changes Since Proposal
XI. Public Comments and Responses to the Proposed NSPS
XII. Impacts of the Final Rule
A. What are the air impacts?
B. What are the energy impacts?
C. What are the cost impacts?
D. What are the economic impacts?
E. What are the benefits of this final rule?
XIII. Statutory and Executive Order Reviews
A. Executive Order 12866, Regulatory Planning and Review and Executive Order

13563, Improving Regulation and Regulatory Review
B. Paperwork Reduction Act
C. Regulatory Flexibility Act as Amended by the Small Business Regulatory Enforcement Fairness Act (RFA) of 1996 SBREFA), 5 U.S.C. 601 et seq.
D. Unfunded Mandates Reform Act of 1995
E. Executive Order 13132, Federalism
F. Executive Order 13175, Consultation and Coordination With Indian Tribal Governments
G. Executive Order 13045, Protection of Children From Environmental Health Risks and Safety Risks
H. Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use
I. National Technology Transfer and Advancement Act
J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations
K. Congressional Review Act

I. General Information

A. Does this action apply to me?

The regulated categories and entities potentially affected by the final standards are shown in Table 1 of this preamble.

TABLE 1—POTENTIALLY AFFECTED REGULATED CATEGORIES AND ENTITIES

Category	NAICS code [1]	Examples of potentially regulated entities
Industry	221112	Fossil fuel-fired electric utility steam generating units.
Federal government	[2] 221122	Fossil fuel-fired electric utility steam generating units owned by the federal government.
State/local/tribal government	[2] 221122	Fossil fuel-fired electric utility steam generating units owned by states, tribes, or municipalities.
	921150	Fossil fuel-fired electric utility steam generating units in Indian country.

1 North American Industry Classification System.

2 Federal, state, or local government-owned and operated establishments are classified according to the activity in which they are engaged.

This table is not intended to be exhaustive, but rather is meant to provide a guide for readers regarding entities likely to be affected by this action. To determine whether you, as owner or operator of a facility, company, business, organization, etc., will be regulated by this action, you should examine the applicability criteria in 40 CFR 60.40, 60.40Da, or 60.40c or in 40 CFR 63.9981. If you have any questions regarding the applicability of this action to a particular entity, consult either the air permitting authority for the entity or your EPA regional representative as listed in 40 CFR 60.4 or 40 CFR 63.13 (General Provisions).

B. Where can I get a copy of this document?

In addition to being available in the dockets, an electronic copy of this action will also be available on the Worldwide Web (WWW) through the Technology Transfer Network (TTN). Following signature by the Administrator, a copy of the action will be posted on the TTN's policy and guidance page for newly proposed or promulgated rules at the following address: *http://www.epa.gov/ttn/oarpg/*. The TTN provides information and technology exchange in various areas of air pollution control.

C. Judicial Review

Under CAA section 307(b)(1), judicial review of this final rule is available only by filing a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit by April 16, 2012. Under CAA section 307(d)(7)(B), only an objection to this final rule that was raised with reasonable specificity during the period for public comment (including any public hearing) can be raised during judicial review. This sec-

tion also provides a mechanism for the EPA to convene a proceeding for reconsideration, "[i]f the person raising an objection can demonstrate to the Administrator that it was impracticable to raise such objection within [the period for public comment] or if the grounds for such objection arose after the period for public comment (but within the time specified for judicial review) and if such objection is of central relevance to the outcome of the rule[.]" Any person seeking to make such a demonstration to us should submit a Petition for Reconsideration to the Office of the Administrator, Environmental Protection Agency, Room 3000, Ariel Rios Building, 1200 Pennsylvania Ave. NW., Washington, DC 20004, with a copy to the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section, and the Associate General Counsel for the Air and Radiation Law Office, Office of General Counsel (Mail Code 2344A), Environmental Protection Agency, 1200 Pennsylvania Ave. NW., Washington, DC 20004. Note, under CAA section 307(b)(2), the requirements established by this final rule may not be challenged separately in any civil or criminal proceedings brought by EPA to enforce these requirements.

D. What are the costs and benefits of this final rule?

Consistent with Executive Order (EO) 13563, "Improving Regulation and Regulatory Review," we have estimated the costs and benefits of the final rule. This rule will reduce emissions of HAP, including mercury (Hg), from the electric power industry. Installing the technology necessary to reduce emissions directly regulated by this rule will also reduce the emissions of directly emitted $PM_{2.5}$ and sulfur dioxide (SO_2), a $PM_{2.5}$ precursor. The benefits associated

with these PM and SO_2 reductions are referred to as co-benefits, as these reductions are not the primary objective of this rule.

The EPA estimates that this final rule will yield annual monetized benefits (in 2007$) of between $37 to $90 billion using a 3 percent discount rate and $33 to $81 billion using a 7 percent discount rate. The great majority of the estimates are attributable to co-benefits from reductions in $PM_{2.5}$-related mortality. The annual social costs, approximated by the sum of the compliance costs and monitoring and reporting costs, are $9.6 billion (2007$) and the annual quantified net benefits (the difference between benefits and costs) are $27 to $80 billion using a 3 percent discount rate or $24 to $71 billion using a 7 percent discount rate. It is important to note that the $PM_{2.5}$ co-benefits reported here contain uncertainty, due in part to the important assumption that all fine particles are equally potent in causing premature mortality and because many of the benefits are associated with reducing $PM_{2.5}$ levels at the low end of the concentration distributions examined in the epidemiology studies from which the $PM_{2.5}$-mortality relationships used in this analysis are derived.

The benefits of this rule outweigh costs by between 3 to 1 or 9 to 1 depending on the benefit estimate and discount rate used. The co-benefits are substantially attributable to the 4,200 to 11,000 fewer $PM_{2.5}$-related premature mortalities estimated to occur as a result of this rule. The EPA could not monetize some costs and important benefits, such as some Hg benefits and those for the HAP reduced by this final rule other than Hg. Upon considering these limitations and uncertainties, it remains clear that the benefits

of this rule, referred to in short as the Mercury and Air Toxics Standards (MATS), are substantial and far outweigh the costs.

TABLE 2—SUMMARY OF THE MONETIZED BENEFITS, SOCIAL COSTS, AND NET BENEFITS FOR THE FINAL RULE IN 2016

[Billions of 2007$][a]

	3% Discount rate	7% Discount rate
Total Monetized Benefits[b]	$37 to $90	$33 to $81.
Partial Hg-related Benefits[c]	$0.004 to $0.006	$0.0005 to $0.001.
$PM_{2.5}$-related Co-benefits[b]	$36 to $89	$33 to $80.
Climate-related Co-Benefits[d]	$0.36	$0.36.
Total Social Costs[e]	$9.6	$9.6.
Net Benefits	$27 to $80	$24 to $71.
Non-monetized Benefits	Visibility in Class I areas.	
	Other neurological effects of Hg exposure.	
	Other health effects of Hg exposure.	
	Health effects of ozone and direct exposure to SO_2 and NO_2.	
	Ecosystem effects.	
	Health effects from commercial and non-freshwater fish consumption.	
	Health risks from exposure to non-mercury HAP.	

a All estimates are for 2016, and are rounded to two significant figures.

b The total monetized benefits reflect the human health benefits associated with reducing exposure to $PM_{2.5}$. The reduction in premature fatalities each year accounts for over 90 percent of total monetized benefits. Benefits in this table are nationwide and are associated with directly emitted $PM_{2.5}$ and SO_2 reductions. The estimate of social benefits also includes CO_2-related benefits calculated using the social cost of carbon, discussed further in chapter 5 of the RIA. Mercury benefits were calculated using the baseline from proposal. The difference in emissions reductions between proposal and final does not substantially affect the Hg benefits.

c Based on an analysis of health effects due to recreational freshwater fish consumption.

d This table shows monetized CO_2 co-benefits that were calculated using the global average social cost of carbon estimate at a 3 percent discount rate. In section 5.6 of the Regulatory Impact Analysis (RIA) we also report the monetized CO_2 co-benefits using discount rates of 5 percent, 2.5 percent, and 3 percent (95th percentile).

e Total social costs are approximated by the compliance costs for both coal- and oil-fired units. This includes monitoring, recordkeeping, and reporting costs.

For more information on how EPA is addressing EO 13563, see the EO discussion in the Statutory and Executive Order Reviews section of this preamble.

II. Background Information on the NESHAP

On May 3, 2011, the EPA proposed this rule to address emissions of toxic air pollutants from coal and oil-fired electric generating units as required by the CAA. The proposal explained at length the statutory history and requirements leading to this rule, the factual and legal basis for the rule and its specific provisions, and the costs and benefits to the public health and environment from the proposed requirements.

The EPA received over 900,000 comments from members of the public on the proposed rule, substantially more than for any other prior regulatory proposal. The comments express concerns about the presence of Hg in the environment and the effect it has on human health, concerns about the costs of the rule, how challenging it may be for some sources to comply and questions about the impact it may have on this country's electricity supply and economy. Many comments provided additional information and data that have enriched the factual record and enabled EPA to finalize a rule that fulfills the mandate of the CAA while providing flexibility and compliance options to affected sources—options that make the rule less costly and compliance more readily manageable.

This rule establishes uniform emissions-control standards that sources can meet with proven and available technologies and operational processes in a timeframe that is achievable. They will put this industry, now the single largest source of Hg emissions

in the United States (U.S.) with emissions of 29 tons per year, on a path to reducing those emissions by approximately 90 percent. Emissions of other toxic metals, such as arsenic (As) and nickel (Ni), dioxins and furans, acid gases (including hydrochloric acid (HCl) and SO_2) will also decrease dramatically with the installation of pollution controls. And the flexibilities established in this rule along with other available tools provide a clear pathway to compliance without jeopardizing the country's energy supply.

This preamble explains EPA's appropriate and necessary finding, the elements of the final rule, key changes the EPA is making in response to comments submitted on the proposed rule, and our responses to many of the comments we received. A full response to comments is provided in the response to comments document available in the docket for this rulemaking.

A. What is the statutory authority for this final rule?

Congress established a specific structure for determining whether to regulate EGUs under CAA section 112.[1] Specifically, Congress enacted CAA section 112(n)(1).

Section 112(n)(1)(A) of the CAA requires the EPA to conduct a study to evaluate the remaining public health hazards that are reasonably anticipated to occur as a result of EGUs' HAP emissions after imposition of CAA requirements. The EPA must report the results of that study to Congress, and regulate EGUs "if the Administrator finds such regulation is appro-

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[1] "Electric utility steam generating unit" is defined, in part, as any "fossil fuel fired combustion unit of more than 25 megawatts that serves a generator that produces electricity for sale." *See* CAA section 112(a)(8).

priate and necessary," after considering the results of that study. Thus, CAA section 112(n)(1)(A) governs how the Administrator decides whether to list EGUs for regulation under CAA section 112. *See New Jersey v. EPA*, 517 F.3d 574 at 582 (D.C. Cir. 2008) ("Section 112(n)(1) governs how the Administrator decides whether to list EGUs; it says nothing about delisting EGUs.").

As directed, the EPA conducted the study to evaluate the remaining public health hazards and reported the results to Congress (Utility Study Report to Congress (Utility Study)).[2] We discuss this study below in conjunction with other studies that CAA section 112(n)(1) requires concerning EGUs. See also 76 FR 24982–24984 (summarizing studies).

Once the EPA lists a source category pursuant to CAA section 112(c), the EPA must then establish technologybased emission standards under CAA section 112(d). For major sources, the EPA must establish emission standards that "require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section" that the EPA determines are achievable taking into account certain statutory factors. *See* CAA section 112(d)(2). These standards are referred to as "maximum achievable control technology" or "MACT" standards. The MACT standards for existing sources must be at least as stringent as the average emission limitation achieved by the best performing 12 percent of existing sources in the category (for which the Administrator has emissions information) or the best performing 5

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[2] U.S. EPA. Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units—Final Report to Congress. EPA–453/R–98–004a. February 1998.

sources for source categories with less than 30 sources. *See* CAA section 112(d)(3)(A) and (B), respectively. This level of minimum stringency is referred to as the "MACT floor," and the EPA cannot consider cost in setting the floor. For new sources, MACT standards must be at least as stringent as the control level achieved in practice by the best controlled similar source. *See* CAA section 112(d)(3).

The EPA also must consider more stringent "beyond-the-floor" control options. When considering beyond-thefloor options, the EPA must consider the maximum degree of reduction in HAP emissions and take into account costs, energy, and non-air quality health and environmental impacts when doing so. *See Cement Kiln Recycling Coal.* v. *EPA*, 255 F.3d 855, 857–58 (D.C. Cir. 2001).

Alternatively, the EPA may set a health-based standard for HAP that have an established health threshold, and the standard must provide "an ample margin of safety." *See* CAA section 112(d)(4). As these standards could be less stringent than MACT standards, the Agency must have detailed information on HAP emissions from the subject sources and sources located near the subject sources before exercising its discretion to set such standards.

For area sources, the EPA may issue standards or requirements that provide for the use of generally available control technologies or management practices (GACT standards) in lieu of promulgating MACT or health-based standards. *See* CAA section 112(d)(5).

As noted above, CAA section 112(n) requires completion of various reports concerning EGUs. For the

first report, the Utility Study, Congress required the EPA to evaluate the hazards to public health reasonably anticipated to occur as the result of HAP emissions from EGUs after imposition of the requirements of the CAA. *See* CAA section 112(n)(1)(A). The EPA was required to report results from this study to Congress by November 15, 1993. *Id.* Congress also directed the EPA to conduct "a study of mercury emissions from [EGUs], municipal waste combustion units, and other sources, including area sources" (Mercury Study). *See* CAA section 112(n)(1)(B). The EPA was required to report the results from this study to Congress by November 15, 1994. *Id.* In conducting this Mercury Study, Congress directed the EPA to "consider the rate and mass of such emissions, the health and environmental effects of such emissions, technologies which are available to control such emissions, and the costs of such technologies." *Id.* Congress directed the National Institute of Environmental Health Sciences (NIEHS) to conduct the last required evaluation, "a study to determine the threshold level of mercury exposure below which adverse human health effects are not expected to occur" (NIEHS Study). *See* CAA section 112(n)(1)(C). The NIEHS was required to submit the results to Congress by November 15, 1993. *Id.* In conducting this study, NIEHS was to determine "a threshold for mercury concentrations in the tissue of fish which may be consumed (including consumption by sensitive populations) without adverse effects to public health." *Id.*

In addition, Congress, in conference report language associated with the EPA's fiscal year 1999 appropriations, directed the EPA to fund the National Academy of Sciences (NAS) to perform an independent evaluation of the available data related to the

health impacts of methylmercury (MeHg) (NAS Study or MeHg Study). H.R. Conf. Rep. No 105–769, at 281–282 (1998). Specifically, Congress required NAS to advise the EPA as to the appropriate reference dose (RfD) for MeHg. 65 FR 79826. The RfD is the amount of a chemical which, when ingested daily over a lifetime, is anticipated to be without adverse health effects to humans, including sensitive subpopulations. In the same conference report, Congress indicated that the EPA should not make the appropriate and necessary regulatory determination for Hg emissions until the EPA had reviewed the results of the NAS Study. *See* H.R. Conf. Rep. No 105–769, at 281–282 (1998).

As directed by Congress through different vehicles, the NAS Study and the NIEHS Study evaluated the same issues. The NIEHS completed the NIEHS Study in 1995,[3] and the NAS completed the NAS Study in 2000.[4] Because NAS completed its study 5 years after the NIEHS Study, and considered additional information not earlier available to NIEHS, for purposes of this document we discuss the content of the NAS Study as opposed to the NIEHS Study.

The EPA conducted the studies required by CAA section 112(n)(1) concerning utility HAP emissions, the Utility Study and the Mercury Study,[5] and completed both by 1998. Prior to issuance of the Mercury

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[3] NIEHS Study, August 1995; EPA–HQ–OAR–2009–3053.

[4] National Research Council (NAS). 2000. Toxicological Effects of Methylmercury. Committee on the Toxiological Effects of Methylmercury, Board on Environmental Studies and Toxicology, National Research Council.

[5] Mercury Study Report to Congress, December 1997; EPA–HQ–OAR–2009–0234–3054.

Study, the EPA engaged in two extensive external peer reviews of the document.

On December 20, 2000, the EPA issued a finding pursuant to CAA section 112(n)(1)(A) that it was appropriate and necessary to regulate coal- and oil-fired EGUs under CAA section 112 and added such units to the list of source categories subject to regulation under CAA section 112(d). In making that finding, the EPA considered the Utility Study, the Mercury Study, the NAS Study, and certain additional information, including information about Hg emissions from coal-fired EGUs that the EPA obtained pursuant to an information collection request (ICR) under the authority of CAA section 114. 65 FR 79826–27.

B. What is the litigation history of this final rule?

Shortly after issuance of the December 2000 finding, an industry group challenged that finding in the Court of Appeals for the D.C. Circuit (D.C. Circuit). *Utility Air Regulatory Group (UARG)* v. *EPA*, 2001 WL 936363, No. 01–1074 (D.C. Cir. July 26, 2001). The D.C. Circuit dismissed the lawsuit holding that it did not have jurisdiction because CAA section 112(e)(4) provides, in pertinent part, that "no action of the Administrator * * * listing a source category or subcategory under subsection (c) of this section *shall be a final agency action subject to judicial review*, except that any such action may be reviewed under section 7607 of (the CAA) when the Administrator issues emission standards for such pollutant or category." *Id. (emphasis added).*

Pursuant to a settlement agreement, the deadline for issuing emission standards was March 15, 2005. However, instead of issuing emission standards pur-

suant to CAA section 112(d), on March 29, 2005, the EPA issued the Section 112(n) Revision Rule (2005 Action). That action delisted EGUs after finding that it was neither appropriate nor necessary to regulate such units under CAA section 112. In addition, on May 18, 2005, the EPA issued the Clean Air Mercury Rule (CAMR). 70 FR 28606. That rule established standards of performance for emissions of Hg from new and existing coal-fired EGUs pursuant to CAA section 111.

Environmental groups, states, and tribes challenged the 2005 Action and CAMR. Among other things, the environmental and state petitioners argued that the EPA could not remove EGUs from the CAA section 112(c) source category list without following the requirements of CAA section 112(c)(9).

On February 8, 2008, the D.C. Circuit vacated both the 2005 Action and CAMR. The D.C. Circuit held that the EPA failed to comply with the requirements of CAA section 112(c)(9) for delisting source categories. Specifically, the D.C. Circuit held that CAA section 112(c)(9) applies to the removal of "any source category" from the CAA section 112(c) list, including EGUs. The D.C. Circuit found that, by enacting CAA section 112(c)(9), Congress limited the EPA's discretion to reverse itself and remove source categories from the CAA section 112(c) list. The D.C. Circuit found that the EPA's contrary position would "nullify § 112(c)(9) altogether." *New Jersey* v. *EPA*, 517 F.3d 574, 583 (D.C. Cir. 2008). The D.C. Circuit did not reach the merits of petitioners' arguments on CAMR, but vacated CAMR for existing sources because coal-fired EGUs were already listed sources under CAA section 112. The D.C. Circuit reasoned that even un-

der the EPA's own interpretation of the CAA, regulation of existing sources' Hg emissions under CAA section 111 was prohibited if those sources were a listed source category under CAA section 112.[6] *Id.* The D.C. Circuit vacated and remanded CAMR for new sources because it concluded that the assumptions the EPA made when issuing CAMR for new sources were no longer accurate (*i.e.*, that there would be no CAA section 112 regulation of EGUs and that the CAA section 111 standards would be accompanied by standards for existing sources). *Id.* at 583–84. Thus, CAMR and the 2005 Action became null and void.

On December 18, 2008, several environmental and public health organizations filed a complaint in the U.S. District Court for the District of Columbia.[7] They alleged that the Agency had failed to perform a nondiscretionary duty under CAA section 304(a)(2), by failing to promulgate final CAA section 112(d) standards for HAP from coal- and oil-fired EGUs by the statutorily-mandated deadline, December 20, 2002, 2 years after such sources were listed under CAA section 112(c). The EPA settled that litigation. The consent decree resolving the case requires the EPA to sign a notice of proposed rulemaking setting

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[6] In CAMR and the 2005 Action, EPA interpreted section 111(d) of the Act as prohibiting the Agency from establishing an existing source standard of performance under CAA section 111(d) for any HAP emitted from a particular source category, if the source category is regulated under CAA section 112.

[7] American Nurses Association, Chesapeake Bay Foundation, Inc., Conservation Law Foundation, Environment America, Environmental Defense Fund, Izaak Walton League of America, Natural Resources Council of Maine, Natural Resources Defense Council, Physicians for Social Responsibility, Sierra Club, The Ohio Environmental Council, and Waterkeeper Alliance, Inc. (Civ. No. 1:08–cv–02198 (RMC)).

forth the EPA's proposed CAA section 112(d) emission standards for coal- and oil-fired EGUs by March 16, 2011, and a notice of final rulemaking by December 16, 2011.[8]

C. What is the relationship between this final rule and other combustion rules?

1. CAA Section 111

The EPA promulgated revised NSPS for SO_2, nitrogen oxides (NO_X), and PM under CAA section 111 for EGUs (40 CFR part 60, subpart Da) and industrial boilers (IB) (40 CFR part 60, subparts Db and Dc) on February 27, 2006 (71 FR 9866). As noted elsewhere, in this action we are finalizing certain amendments to 40 CFR part 60, subpart Da. In developing this final rule, we considered the monitoring, testing, and recordkeeping requirements of the existing and revised NSPS to avoid duplicating requirements to the extent possible.

2. CAA Section 112

The EPA has previously developed other non-EGU combustion-related NESHAP under CAA section 112(d). The EPA promulgated final NESHAP for major source industrial, commercial and institutional boilers and process heaters (IB) and area source in-

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[8] The consent decree originally required EPA to sign a notice of final rulemaking no later than November 16, 2011; however, on October 21, 2011, pursuant to paragraph 6 of the consent decree, the parties agreed to a 30-day extension of the final rule deadline. As stated in the stipulation memorializing the extension, the parties agreed to the extension of 30 days because EPA provided an additional 30 days for public comment and the time was necessary to respond to comments submitted on the proposed rule.

dustrial, commercial and institutional boilers on March 21, 2011 (40 CFR part 63, subpart DDDDD, 76 FR 15608; and subpart JJJJJJ, 76 FR 15249, respectively), and promulgated standards for stationary combustion turbines (CT) on March 5, 2004 (40 CFR part 63 subpart YYYY; 69 FR 10512). In addition to these three NESHAP, on March 21, 2011, the EPA also promulgated final CAA section 129 standards for commercial and institutional solid waste incineration (CISWI) units, including energy recovery units (40 CFR part 60, subparts CCCC (NSPS) and DDDD (emission guidelines); 76 FR 15704); and a definition of non-hazardous secondary materials that are solid waste (Non-hazardous Solid Waste Definition Rule (40 CFR part 241, subpart B; 76 FR 15456)). Electric generating units and IB that combust fossil fuel and solid waste, as that term is defined by the Administrator pursuant to the Resource Conservation and Recovery Act (RCRA), *see* 76 FR 15456, will be subject to standards issued pursuant to CAA section 129 (*e.g.*, CISWI), unless they meet one of the exemptions in CAA section 129(g)(1). Clean Air Act section 129 standards are discussed in more detail below.

The two IB (Boiler) NESHAP, the CT NESHAP, and this final rule will regulate HAP emissions from sources that combust fossil fuels for electrical power, process operations, or heating. The differences among these rules are due to the size of the units (megawatt (MW), megawatt-electric (MWe), or British thermal unit per hour (Btu/hr)), the boiler/furnace technology, and/or the portion of their electrical output (if any) for sale to any utility power distribution systems.

Pursuant to the CAA, an EGU is "any fossil fuel fired combustion unit of more than 25 megawatts that serves a generator that produces electricity for sale. A unit that cogenerates steam and electricity and supplies more than one-third of its potential electric output capacity and more than 25 megawatts electrical output to any utility power distribution system for sale shall be considered an electric utility steam generating unit." CAA section 112(a)(8). We consider all of the MW ratings quoted in the final rule to be the original rated nameplate capacity of the unit. We consider cogeneration to be the simultaneous production of power (electricity) and another form of useful thermal energy (usually steam or hot water) from a single fuel-consuming process.

We consider any combustion unit, regardless of size, that produces steam to serve a generator that produces electricity exclusively for industrial, commercial, or institutional purposes (*i.e.*, makes no sales to the national electrical distribution grid) to be an IB unit. We do not consider a fossil fuel-fired combustion unit that serves a generator that produces electricity for sale to be an EGU under the final rule if the size of the combustion unit is less than or equal to 25 MW. Units that are 25 MW or less are likely subject to one of the two Boiler NESHAP.

Because of the combustion technology of simple-cycle and combined-cycle stationary CTs (with the exception of integrated gasification combined cycle (IGCC) units that burn gasified coal or petroleum

coke synthesis gas/syngas), we do not consider these CTs to be EGUs for purposes of this final rule.[9]

The December 2000 listing discussed above did not list natural gas-fired EGUs. Thus, this final rule does not regulate a unit that otherwise meets the CAA section 112(a)(8) definition of an EGU but that combusts natural gas exclusively or natural gas in combination with another fossil fuel where the natural gas constitutes 90.0 percent or more of the average annual heat input during any 3 consecutive calendar years or 85.0 percent or more of the annual heat input in one calendar year. We consider such units to be natural gas-fired EGUs notwithstanding the combustion of some coal or oil (or derivative thereof) and such units are not subject to this final rule.

The CAA does not define the terms "fossil fuel-fired" and "fossil fuel." In this rule, we are finalizing definitions for both terms for purposes of this rule. The definition of "fossil fuel-fired" will help determine the applicability of the final rule to combustion units that sell electricity to the utility power distribution system. The definition of "fossil fuel-fired" establishes the amount of fossil fuel combustion necessary to make a unit "fossil fuel-fired" and hence potentially subject to this final rule. These definitions will help determine applicability of the final rule to units that primarily fire non-fossil fuels (*e.g.*, biomass) but generally start up using either natural gas or distillate oil and may use these fuels (or coal) during normal operation for flame stabilization.

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[9] The CT NESHAP regulates HAP emissions from all simple-cycle and combined-cycle stationary CTs producing electricity or steam for any purpose.

In addition, the EPA is finalizing in the definition of "fossil fuel-fired" that, among other things, an EGU must fire coal or oil for more than 10.0 percent of the average annual heat input during any 3 consecutive calendar years or for more than 15.0 percent of the annual heat input during any one calendar year after the applicable compliance date in order to be considered a fossil fuel-fired EGU subject to this final rule. The EPA has based these threshold percentage values on the definition of "oil-fired" in the Acid Rain Program (ARP) found at 40 CFR 72.2. Though the EPA does not have annual heat input data for, for example, biomass co-fired EGUs because their use is not yet commonplace, we believe this definition accounts for the use of fossil fuels for flame stabilization use without inappropriately subjecting such units to this final rule.

Units that do not meet the EGU definition will in most cases be considered IB units subject to one of the two Boiler NESHAP. Thus, for example, a biomass-fired EGU, regardless of size, that utilizes fossil fuels for startup and flame stabilization purposes only (*i.e.*, less than or equal to 10.0 percent of the average annual heat input in any 3 consecutive calendar years or less than or equal to 15.0 percent of the annual heat input during any one calendar year) is not considered to be a fossil fuel-fired EGU under this final rule.

A cogeneration facility that sells electricity to any utility power distribution system equal to more than one-third of its potential electric output capacity and more than 25 MW will be considered an EGU if the facility is fossil fuel-fired as that term is defined in the final rule.

We recognize that different CAA section 112 rules may impact a particular unit at different times. For example, the Boiler NESHAP may cover some cogeneration units. Such a unit may decide to increase or decrease the proportion of production output it supplies to the electric utility grid, thus causing the unit to meet the EGU cogeneration criteria (*i.e.*, greater than one-third of its potential output capacity and greater than 25 MW). A unit subject to one of the Boiler NESHAP that increases its electricity output and meets the definition of an EGU would be subject to the final EGU NESHAP.

Another rule intersection may occur where one or more coal- or oil-fired EGU(s) share an air pollution control device (APCD) and/or an exhaust stack with one or more similarly-fueled IB unit(s). To demonstrate compliance with two different rules, either the emissions would need to be apportioned to the appropriate source or the more stringent emission limit would need to be met. Data needed to apportion emissions are not currently required by this final rule or the final boiler NESHAP and are not otherwise available. Therefore, the EPA is finalizing the requirement to comply with the more stringent emission limit.

3. CAA Section 129

Clean Air Act section 129 regulates units that combust "non-hazardous secondary materials," as that term is defined by the Administrator under the Resource Conservation and Recovery Act (RCRA), that are "solid wastes." On March 21, 2011, the EPA promulgated the final Non-Hazardous Solid Waste Definition Rule (76 FR 15456). Any EGU that combusts any solid waste as defined in that final rule is a

solid waste incineration unit subject to emissions standards under CAA section 129.

In the Non-Hazardous Solid Waste Definition Rule, the EPA determined that coal refuse from current mining operations is not considered to be a "solid waste" if it is not discarded. Coal refuse that is in legacy coal refuse piles is considered a "solid waste" because it has been discarded. However, if discarded coal refuse is processed in the same manner as currently mined coal refuse, the coal refuse would not be considered a solid waste but instead would be considered a product fossil fuel. Therefore, the combustion of such material by a combustion unit would not subject that unit to regulation under CAA section 129. Instead, the unit would be subject to this final rule if it meets the definition of EGU. In the proposed rule, we assumed that all units that combust coal refuse and otherwise meet the definition of a coal-fired EGU are in fact combusting newly mined coal refuse or coal refuse from legacy piles that has been processed such that it is not a solid waste. We did not receive any information since proposal that would cause us to revise this determination in the final rule.

Further, CAA section 129(g)(1)(B) exempts from regulation

> "* * * qualifying small power production facilities, as defined in section 796(17)(C) of Title 16, or qualifying cogeneration facilities, as defined in section 796(18)(B) of Title 16, which burn homogeneous waste * * * for the production of electric energy or in the case of qualifying cogeneration facilities which burn homogeneous waste for the production of electric energy and steam or forms of useful energy (such as heat) which are

used for industrial, commercial, heating or cooling purposes * * *"

If the "homogeneous waste" material that such facilities combust is also a fossil fuel, and those facilities otherwise meet the definition of an EGU under CAA section 112(a)(8), then those facilities are exempt from regulation under CAA section 129 but covered under this final rule. For example, a qualifying small power production facility or cogeneration facility combusting only coal refuse that is a solid waste and a "homogenous waste," as that term is defined in the final CAA section 129 CISWI standards, would be subject to this final rule if the unit also met the definition of EGU.

D. What are the health effects of pollutants emitted from coal- and oil-fired EGUs?

This final rule protects air quality and promotes public health by reducing emissions of some of the HAP listed in CAA section 112(b)(1). Utilities are by far the largest anthropogenic source of Hg in the U.S. In addition, EGUs are the largest source of HCl, hydrogen fluoride (HF), and selenium (Se) emissions, and a major source of metallic HAP emissions including As, chromium (Cr), Ni, and others. The discrepancy is even greater now that almost all other major source categories have been required to control Hg and other HAP under CAA section 112. In 2005, U.S. EGUs emitted 50 percent of total domestic anthropogenic Hg emissions, 62 percent of total As emissions, 39 percent of total cadmium (Cd) emissions, 22 percent of total Cr emissions, 82 percent of total HCl emissions, 62 percent of total HF emissions, 28 percent of total Ni emissions, and 83 percent of total Se

emissions.[10] Exposure to these HAP, depending on exposure duration and levels of exposures, is associated with a variety of adverse health effects. These adverse health effects may include chronic health disorders (*e.g.*, irritation of the lung, skin, and mucus membranes; detrimental effects on the central nervous system; damage to the kidneys; and alimentary effects such as nausea and vomiting). Two of the HAP are classified as human carcinogens (As and CrVI) and two as probable human carcinogens (Cd and Ni). *See* 76 FR 25003–25005 for a fuller discussion of the health effects associated with these pollutants.

III. Appropriate and Necessary Finding

A. Overview

In December 2000, the EPA issued a finding pursuant to CAA section 112(n)(1)(A) that it was appropriate and necessary to regulate coal- and oil-fired EGUs under CAA section 112 and added such units to the list of source categories subject to regulation under section 112(d). The EPA found that it was appropriate to regulate HAP emissions from coal- and oil-fired EGUs because, among other reasons, Hg is a hazard to public health, and U.S. EGUs are the largest domestic source of Hg emissions. The EPA also found it appropriate to regulate HAP emissions from EGUs because it had identified certain control options that would effectively reduce HAP emissions from U.S. EGUs. The EPA found that it was necessary to regulate HAP emissions from U.S. EGUs under section 112 because the implementation of other

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[10] From 2005 National-Scale Air Toxics Assessment (NATA), available at *http://www.epa.gov/ttn/atw/nata2005/*.

requirements under the CAA will not adequately address the serious public health and environmental hazards arising from HAP emissions from U.S. EGUs and that CAA section 112 is intended to address HAP emissions. *See* 76 FR 24984–20985 (for further discussion of 2000 finding).

Because several years had passed since the 2000 finding, the EPA performed additional technical analyses for the proposed rule, even though those analyses were not required. These analyses included a national-scale Hg risk assessment focused on populations with high levels of self-caught fish consumption, and a set of 16 case studies of inhalation cancer risks for non-Hg HAP. The analyses confirm that it remains appropriate and necessary to regulate U.S. EGUs under section 112.

In the preamble to the proposed rule, the EPA reported the results of those additional technical analyses. Those analyses confirmed the 2000 finding that it is appropriate to regulate U.S. EGUs under section 112 by demonstrating that (1) Hg continues to pose a hazard to public health because up to 28 percent of watersheds were estimated to have Hg deposition attributable to U.S. EGUs that contributes to potential exposures above the reference dose for methylmercury (MeHg RfD), a level above which there is increased risk of neurological effects in children, (2) non-Hg HAP emissions pose a hazard to public health because case studies at 16 facilities demonstrated that lifetime cancer risks at 4 of the facilities exceed 1 in 1 million, and (3) U.S. EGUs remain the largest domestic source of Hg emissions and several HAP (*e.g.*, HF, Se, HCl), and are among the largest contributors for other HAP (*e.g.*, As, Cr, Ni, HCN). Thus, in the pre-

amble to the proposed rule, the EPA found that Hg and non-Hg HAP emissions from U.S. EGUs pose hazards to public health, which confirmed the 2000 finding and demonstrated that it remains appropriate to regulate U.S. EGUs under section 112.

In the preamble to the proposed rule, the EPA also found that it is appropriate to regulate U.S. EGUs because (1) Hg emissions pose a hazard to the environment and wildlife, adversely impacting species of fish-eating birds and mammals, (2) acid gas HAP pose a hazard to the environment because they contribute to aquatic acidification, and (3) effective controls are available to reduce Hg and non-Hg HAP emissions from U.S. EGUs.

The additional analyses reported in the preamble to the proposed rule also confirmed that it remains necessary to regulate U.S. EGU under CAA section 112. These analyses demonstrated that (1) Hg emissions from U.S. EGUs remaining in 2016 are reasonably anticipated to pose a hazard to public health after imposition of other CAA requirements, such as the Cross-State Air Pollution Rule (CSAPR); (2) U.S. EGUs are reasonably anticipated to remain the largest source of Hg in the U.S. and thus contribute to the risk associated with exposure to MeHg; (3) Hg emissions from U.S. EGUs after imposition of the requirements of the CAA were projected to be 29 tons per year in 2016, similar to levels of Hg emitted today, indicating that further substantial reductions in Hg emissions are not reasonably anticipated without federal regulations on Hg from U.S. EGUs; (4) we cannot be certain that the identified cancer risks attributable to non-Hg emissions from U.S. EGUs will be addressed through imposition of the requirements

of the CAA because companies can use compliance strategies for criteria pollutants that do not achieve HAP co-benefits (*e.g.*, purchasing allowances in a trading program); and (5) we cannot ensure that Hg and non-Hg HAP emissions reductions achieved since 2005 would be permanent without federally binding regulations for Hg from U.S. EGUs.

Since issuance of the proposed rule, the EPA has conducted peer reviews of the national-scale Hg risk assessment (Hg Risk TSD) and the approach for estimating chromium and nickel inhalation cancer risk in the case studies.[11] [12] The peer review of the Hg Risk TSD was conducted by EPA's independent Science Advisory Board (SAB). The SAB stated that it "supports the overall design of and approach to the risk assessment and finds that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs."[13] SAB recommended several improvements to the data, methods and docu-

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[11] U.S. EPA. 2011a. *National-Scale Assessment of Mercury Risk to Populations with High Consumption of Self-caught Freshwater Fish In Support of the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units.* Office of Air Quality Planning and Standards. November. EPA–452/R–11–009.

[12] U.S. EPA. 2011b. *Supplement to Non-mercury Case Study Chronic Inhalation Risk Assessment for the Utility MACT Appropriate and Necessary Analysis.* Office of Air Quality Planning and Standards. November.

[13] U.S. Environmental Protection Agency-Science Advisory Board (U.S. EPA–SAB). 2011. Peer Review of EPA's Draft National-Scale Mercury Risk Assessment. EPA–SAB–11–017. September. Available on the Internet at *http://yosemite.epa.gov/sab/sabproduct.nsf/BCA23C5B7917F5BF8525791A0072CCA1/$File/EPA-SAB-11-017-unsigned.pdf.*

mentation of the analyses, which EPA has fully addressed in the revised Hg Risk TSD.

As described in the revised Hg Risk TSD, after addressing comments from the peer review, the revised results show that up to 29 percent of modeled watersheds are estimated to have Hg deposition attributable to U.S. EGUs that contributes to potential exposures above the MeHg RfD, an increase of one percentage point from the results reported in the proposed rule. We conclude that Hg emissions from EGUs pose a hazard to public health based on the total of 29 percent of modeled watersheds at risk. Our analyses show that of the 29 percent of watersheds with population at-risk, in 10 percent of those watersheds U.S. EGU deposition alone without considering deposition from other sources would lead to potential exposures that exceed the MeHg RfD, and in 24 percent of those watersheds, total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition.[14] [15] Each of these results independently supports our conclusion that

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[14] Because some watersheds with exposures sufficient to exceed the RfD with Hg deposition from U.S. EGUs alone without considering deposition from other sources also have U.S. EGU contributions of more than 5 percent of total Hg deposition, there is some overlap between the two risk metrics. This explains why the total percent of watersheds exceeding either risk metric is less than the sum of the individual risk metrics.

[15] Requiring at least a 5 percent EGU contribution is a conservative approach given the increasing risks associated with incremental exposures above the RfD. Because we are finding 24 percent of watersheds with populations potentially at risk even using this conservative approach, we have confidence that emissions of Hg from U.S. EGUs are causing a hazard to public health.

Hg emissions from EGUs pose hazards to public health.

The peer review of the approach to estimate Ni and Cr cancer risk in the case studies also supported EPA's assessment. The EPA enhanced this analysis in response to the peer review and public comments. The results of those revised analyses show that 6 of 16 modeled facilities have lifetime cancer risks greater than 1 in a million, thus confirming that non-Hg HAP emissions from U.S. EGUs remain a hazard to public health. Given Congress' determination that categories of sources that emit HAP resulting in a lifetime cancer risk greater than 1 in a million should not be removed from the CAA section 112(c) source category list and should continue to be regulated under CAA section 112, the EPA concludes that risk above that level represents a hazard to public health.

Based on our consideration of the peer reviews, public comments, and our updated analyses, we confirm the findings that Hg and non-Hg HAP emissions from U.S. EGUs pose hazards to public health and that it remains appropriate to regulate U.S. EGUs under CAA section 112. We also conclude that it remains appropriate to regulate U.S. EGUs under CAA section 112 because of the magnitude of Hg and non-Hg emissions, environmental effects of Hg and certain non-Hg emissions, and the availability of controls to reduce HAP emissions from EGUs.

In addition, we conclude that the hazards to public health from Hg and non-Hg emissions from U.S. EGUs are reasonably anticipated to remain after imposition of the requirements of the CAA. The same is true for hazards to the environment. Thus, we con-

firm that it is necessary to regulate U.S. EGUs under CAA section 112.

B. Peer Review of the Hg Risk TSD Supporting the Appropriate and Necessary Finding for Coal and Oil-Fired EGUs and EPA Response

In the preamble to the proposed rule, the EPA stated that "in making the finding that it remains appropriate and necessary to regulate EGUs to address public health and environmental hazards associated with emissions of Hg and Non-Hg HAP from EGUs, the EPA determined that the Hg Risk TSD supporting EPA's 2011 review of U.S. EGU health impacts should be peer-reviewed."[16] We also indicated that due to the court-ordered schedule for the final rule, we planned to conduct the peer review as expeditiously as possible after issuance of the proposed rule, and that the results of the peer review and any EPA response would be published before the final rule. Due to the extension of the public comment period and the volume of public comments received on the analyses supporting the proposed rule, we were unable to publish EPA's response prior to signature of the final rule.

The EPA's response to the peer review the Hg Risk TSD is fully documented in the revised Technical Support Document (TSD): National-Scale Assessment of Hg Risk to Populations of High Consumption of Self-Caught Fish In Support of the Appropriate and Necessary Finding for Coal and Oil-Fired Electric Generating Units.[17] The following sections describe the peer review process that we followed, pro-

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[16] 76 FR 25012.

[17] U.S. EPA, 2011a.

vide the peer review charge questions presented to the peer review panel, summarize the key recommendations from the peer review, and summarize our responses to those recommendations.

1. Summary of Peer Review Process

Peer review is consistent with EPA's open and transparent process to ensure that the Agency's scientific assessments and rulemakings are based on the best science available. This regulatory action was supported by the Hg Risk TSD, which is a highly influential scientific assessment. Therefore, the EPA conducted a peer review in accordance with OMB's *Final Information Quality Bulletin for Peer Review*[18] as described below. All the materials related to the peer review, including the SAB's final report, can be found in the docket for this rulemaking.

The EPA commissioned the peer review through EPA's SAB, which provides independent advice and peer review to EPA's Administrator on the scientific and technical aspects of environmental issues. The SAB convened a 22-member peer review committee. The SAB process for selecting the panel began with two **Federal Register** Notices requesting nominations for the *Mercury Review Panel.*[19] Based on nomi-

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[18] Office of Management and Budget (OMB). 2004. *Final Information Quality Bulletin for Peer Review.* December. Available on the Internet at *http://www.whitehouse.gov/omb/memoranda_fy2005_m05-03.*

[19] 76 FR 10896 and 76 FR 17649. The first notice requested nominations to a Clean Air Scientific Advisory Committee (CASAC) panel. Upon review of the scope of the CASAC charter (resulting from a public comment received in response to the first notice), the SAB determined that it would be more appropriate to form a panel under the SAB, rather than CASAC. The

nations received, a list of potential panel members, along with bio-sketches, was posted for public comment on the SAB Web site on April 15, 2011. The members of the *Mercury Review Panel* were announced on May 24, 2011. The membership of the panel included representatives of 16 academic institutions, 4 state health or environmental agencies, 1 federal agency, and 1 utility industry organization.[20] The panel held a public meeting in Research Triangle Park, NC, on June 15–17, 2011, which included the opportunity for public comment on the Hg Risk TSD and the peer review process.[21] At the June 15–17 public meeting, the panel completed a draft peer review report. The minutes of that meeting and the draft peer review report were posted to the SAB public Web site within the public comment period for the proposed rule. The panel discussed the draft report at a public teleconference on July 12, 2011, during which additional opportunities for public comment were provided,[22] and submitted a revised draft for quality review by the Chartered SAB before the end of the public comment period on the rule. The Chartered SAB held a public teleconference on September 7, 2011, to conduct a quality review of the draft report; this teleconference also included a final opportunity for public comment.[23] The SAB submitted its

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second notice announced this change and requested nominations for the SAB panel.

[20] The full list of panel members is documented at *http://yosemite.epa.gov/sab/sabproduct.nsf/0/9F048172004D93BB8525783900503486/$File/Determination%20memo%20with%20addendum-05.24.11.pdf*.

[21] 76 FR 29746.

[22] 76 FR 39102.

[23] 76 FR 50729.

final report to EPA on September 29, 2011.[24] Notice of all the meetings was published in the **Federal Register** and all of the materials discussed at the SAB meetings, including technical documents, presentations, meeting minutes, and draft reports were posted for public access on the SAB Web site[25] and were added to the docket for the final rule on October 14, 2011.

2. Peer Review Charge Questions

The EPA asked the SAB to comment on the Hg Risk TSD, including the overall design and approach and the use of specific models and key assumptions. The EPA also asked the SAB to comment on the extent to which specific facets of the assessment were well characterized in the Hg Risk TSD. The specific charge questions are listed below:

Question 1. Please comment on the scientific credibility of the overall design of the mercury risk assessment as an approach to characterize human health exposure and risk associated with U.S. EGU mercury emissions (with a focus on those more highly exposed).

Question 2. Are there any additional critical health endpoint(s) besides IQ loss, which could be quantitatively estimated with a reasonable degree of confidence to supplement the mercury risk assessment (*see* section 1.2 of the Mercury Risk TSD for an overview of the risk metrics used in the risk assessment)?

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[24] U.S. EPA–SAB, 2011. Peer Review of EPA's Draft National-Scale Mercury Risk Assessment.

[25] *See http://yosemite.epa.gov/sab/sabpeople.nsf/WebCommittees/BOARD.*

Question 3. Please comment on the benchmark used for identifying a potentially significant public health impact in the context of interpreting the IQ loss risk metric (i.e., an IQ loss of 1 to 2 points or more representing a potential public health hazard). Is there any scientifically credible alternate decrement in IQ that should be considered as a benchmark to guide interpretation of the IQ risk estimates (*see* section 1.2 of the Mercury Risk TSD for additional detail on the benchmark used for interpreting the IQ loss estimates)?

Question 4: Please comment on the spatial scale used in defining watersheds that formed the basis for risk estimates generated for the analysis (i.e., use of 12-digit hydrologic unit code classification). To what extent do [Hydrologic Unit Code] HUC12 watersheds capture the appropriate level of spatial resolution in the relationship between changes in mercury deposition and changes in MeHg fish tissue levels? (see section 1.3 and Appendix A of the Mercury Risk TSD for additional detail on specifying the spatial scale of watersheds used in the analysis).

Question 5: Please comment on the extent to which the fish tissue data used as the basis for the risk assessment are appropriate and sufficient given the goals of the analysis. Please comment on the extent to which focusing on data from the period after 1999 increases confidence that the fish tissue data used are more likely to reflect more contemporaneous patterns of Hg deposition and less likely to reflect earlier patterns of Hg deposition. Are there any additional sources of fish tissue MeHg data that would be appropriate for inclusion in the risk assessment?

Question 6: Given the stated goal of estimating potential risks to highly exposed populations, please comment on the use of the 75th percentile fish tissue MeHg value (reflecting targeting of larger but not the largest fish for subsistence consumption) as the basis for estimating risk at each watershed. Are there scientifically credible alternatives to use of the 75th percentile in representing potential population exposures at the watershed level?

Question 7: Please comment on the extent to which characterization of consumption rates and the potential location for fishing activity for high-end self-caught fish consuming populations modeled in the analysis are supported by the available study data cited in the Mercury Risk TSD. In addition, please comment on the extent to which consumption rates documented in Section 1.3 and in Appendix C of the Mercury Risk TSD provide appropriate representation of high-end fish consumption by the subsistence population scenarios used in modeling exposures and risk. Are there additional data on consumption behavior in subsistence populations active at inland freshwater water bodies within the continental U.S.?

Question 8: Please comment on the approach used in the risk assessment of assuming that a high-end fish consuming population could be active at a watershed if the "source population" for that fishing population is associated with that watershed (e.g., at least 25 individuals of that population are present in a U.S. Census tract intersecting that watershed). Please identify any additional alternative approaches for identifying the potential for population exposures in watersheds and the strengths and limitations associated with these alternative approaches (addition-

al detail on how EPA assessed where specific high-consuming fisher populations might be active is provided in section 1.3 and Appendix C of the Mercury Risk TSD).

Question 9: Please comment on the draft risk assessment's characterization of the limitations and uncertainty associated with application of the Mercury Maps approach (including the assumption of proportionality between changes in mercury deposition over watersheds and associated changes in fish tissue MeHg levels) in the risk assessment. Please comment on how the output of CMAQ [Community Multiscale Air Quality] modeling has been integrated into the analysis to estimate changes in fish tissue MeHg levels and in the exposures and risks associated with the EGU-related fish tissue MeHg fraction (*e.g.*, matching of spatial and temporal resolution between CMAQ modeling and HUC12 watersheds). Given the national scale of the analysis, are there recommended alternatives to the Mercury Maps approach that could have been used to link modeled estimates of mercury deposition to monitored MeHg fish tissue levels for all the watersheds evaluated? (additional detail on the Mercury Maps approach and its application in the risk assessment is presented in section 1.3 and Appendix E of the Mercury Risk TSD).

Question 10: Please comment on the EPA's approach of excluding watersheds with significant non-air loadings of mercury as a method to reduce uncertainty associated with application of the Mercury Maps approach. Are there additional criteria that should be considered in including or excluding watersheds?

Question 11: Please comment on the specification of the concentration-response function used in modeling IQ loss. Please comment on whether EPA, as part of uncertainty characterization, should consider alternative concentration-response functions in addition to the model used in the risk assessment. Please comment on the extent to which available data and methods support a quantitative treatment of the potential masking effect of fish nutrients (*e.g.*, omega-3 fatty acids and selenium) on the adverse neurological effects associated with mercury exposure, including IQ loss (detail on the concentration-response function used in modeling IQ loss can be found in section 1.3 of the Mercury Risk TSD).

Question 12: Please comment on the degree to which key sources of uncertainty and variability associated with the risk assessment have been identified and the degree to which they are sufficiently characterized.

Question 13: Please comment on the draft Mercury Risk TSD's discussion of analytical results for each component of the analysis. For each of the components below, please comment on the extent to which EPA's observations are supported by the analytical results presented and whether there is a sufficient characterization of uncertainty, variability, and data limitations, taking into account the models and data used: Mercury deposition from U.S. EGUs, fish tissue MeHg concentrations, patterns of Hg deposition with HG fish tissue data, percentile risk estimates, and number and frequency of watersheds with populations potentially at risk due to U.S. EGU mercury emissions.

Question 14: Please comment on the degree to which the final summary of key observations in Section 2.8 is supported by the analytical results presented. In addition, please comment on the degree to which the level of confidence and precision in the overall analysis is sufficient to support use of the risk characterization framework described on page 18.

3. Summary of Peer Review Findings and Recommendations

The SAB was generally supportive of EPA's approach.[26] The SAB concluded, "[i]n summary, based on its review of the draft Technical Support Document and additional information provided by EPA representatives during the public meetings, the SAB supports the overall design of and approach to the risk assessment and finds that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs."[27] The SAB further concluded, "[t]he SAB regards the design of the risk assessment as suitable for its intended purpose, to inform decision-making regarding an 'appropriate and necessary finding' for regulation of hazardous air pollutants from coal and oil-fired EGUs, provided that our recommendations are fully considered in the revision of the assessment."[28]

The SAB report contained many recommendations for improving the Hg Risk TSD, which the SAB organized into three general themes: (1) Improve the clarity of the Hg Risk TSD regarding methods and

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[26] U.S. EPA–SAB, 2011.

[27] *Id.*

[28] *Id.*

presentation of results, (2) expand the discussion of sources of variability and uncertainty, and (3) de-emphasize IQ loss as an endpoint. In the following subsection, we provide EPA's response to these recommendations.

4. The EPA's Responses to Peer Review Recommendations

In response to the peer review, the EPA has substantially revised the Hg Risk TSD. The revised Hg Risk TSD addresses all of the recommendations from the SAB and includes a detailed list of the specific revisions made to the Hg Risk TSD. Revisions in response to the main recommendations are summarized below. Italicized statements are the SAB's recommendations, which are followed by EPA's response.

- *The watershed-focus of the Hg Risk TSD should be clearly stated early in the introduction to the document.* We have stated clearly in the introduction to the revised Hg Risk TSD that the focus of the analysis is on scenarios of high fish consumption by subsistence level fishing populations, assessed at watersheds where there is the potential for such subsistence fishing activity. Specifically, we modeled risk for a set of subsistence fisher scenarios at those watersheds where (a) we have measured fish tissue Hg data and (b) it is reasonable to assume that subsistence-level fishing activity could occur. We emphasize the point that the analysis is not a representative population-weighted assessment of risk. Rather, it is based on evaluating these potential exposure scenarios.
- *Because IQ does not fully capture the range of neurodevelopmental effects associated with Hg expo-*

sure, analysis of this endpoint should be deemphasized (and moved to an appendix) and primary focus should be placed on the MeHg RfD-based hazard quotient metric. We modified the structure of the revised Hg Risk TSD accordingly.

- *Clarify the rationale for using a Hazard Quotient (HQ) at or above 1.5 as the basis for selecting potentially impacted watersheds.* The SAB fully supported using HQ as the risk metric, but we revised the discussion in the Hg Risk TSD to clarify why we selected 1.5 as the benchmark. We clarified that exposures above the RfD (*i.e.*, an HQ above one) represent increasing risk of neurological health effects.[29] We further clarified that the HQ is calculated to only one significant digit, based on the precision in the underlying RfD calculations. As a result, rounding convention requires that any values at or above 1.5 be expressed as an HQ of 2, while any values below 1.5 (*e.g.*, 1.49) be rounded to an HQ of 1. Thus, MeHg exposures leading to an HQ at or above 1.5 for pregnant women are considered above the RfD and are associated with increased risk of neurological health effects in children born to those mothers.

- *Regarding the fish tissue dataset used in the Hg Risk TSD, clarify which species of Hg is reflected in the underlying samples and discuss the implications of differences across states in sampling protocols in introducing bias into the analysis.* We clarified that in most cases, the fish tissue is measured for total Hg. Furthermore, based on the scientific litera-

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[29] As stated in the preamble to the proposal, based on the current literature, exposures above the RfD contribute to risk of adverse effects.

ture,[30] it is reasonable to assume that more than 90 percent of fish tissue Hg is MeHg. Therefore, we incorporated an Hg conversion factor [31] into our exposure calculations to account for the fraction of total Hg that is MeHg in fish. We also expanded the discussion of uncertainty to address the potential for different sampling protocols across states to introduce bias into the Hg Risk TSD.

- *Additional detail should be provided on the characteristics of the fish tissue Hg dataset, including its derivation and the distribution of specific attributes across the dataset (e.g., number of fish tissue samples and number of different waterbodies in a watershed, number of species reflected across watersheds).* We included additional figures and tables describing the derivation of the watershed-level fish tissue Hg dataset, including the filtering steps applied to the original water body level data and the additional steps taken to generate the watershed-level fish tissue Hg percentile estimates. In addition, we included tables summarizing key attributes of the dataset (*e.g.*, distribution of fish tissue sample size and number of species across the watershed-level estimates).

- *Determine whether there is additional (more recent) fish tissue data for key states including Penn-*

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[30] See the literature summary in Chapter 4 of U.S. EPA. 2000. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories.* Office of Science and Technology, Office of Water, Washington, DC EPA 823–B–00–007.

[31] In the Hg Risk TSD accompanying the proposed rule, we assumed that 100 percent of Hg in fish was MeHg. We derived the 0.95 conversion factor for the revised Hg Risk TSD to reflect that most studies show that more than 90 percent of total Hg in fish is MeHg. See Chapter 4 of U.S. EPA, 2000.

sylvania, New Jersey, Kentucky and Illinois where U.S. EGUs Hg deposition may be more significant. We expanded the fish tissue dataset by incorporating additional fish tissue data from the National Listing of Fish Advisories (NLFA), which included additional data for four states (MI, NJ, PA, and MN). We also obtained additional data for Wisconsin. These additional data expanded the number of watersheds in the analysis from 2,317 to 3,141, an increase of 36 percent. The additional watersheds improve coverage in areas with high levels of U.S. EGU-attributable Hg deposition, and thus increase our confidence in the overall *results of the Hg Risk TSD.*

- *Include additional discussion of the potential that the low sampling rates reflected across many of the watersheds may low-bias the 75th percentile fish tissue Hg estimates used in estimating potential exposures. In addition, include a sensitivity analysis using the 50th percentile estimates to provide a bound on the risk.* The SAB expressed support for the use of the 75th percentile fish tissue Hg value in the Hg Risk TSD, while recommending additional discussion of the issue. We provided additional description of the fish tissue dataset, including distribution of sample sizes and fish species across the watersheds, and an improved discussion of uncertainty and potential low bias resulting from estimation of the 75th percentile fish tissue levels. We also included a sensitivity analysis that used the 50th percentile watershed-level fish tissue Hg level. This sensitivity analysis showed that using the 50th percentile estimates resulted in a decrease in the number and percentage of modeled watersheds with populations potentially at-risk from U.S. EGU-attributable MeHg exposures, from 29 percent of watersheds exceeding either risk

metric (*i.e.*, MeHg exposure from U.S. EGUs alone exceeds the RfD or total MeHg exposure exceeds the RfD and U.S. EGUs contribute at least 5 percent) in the revised Hg Risk TSD to 26 percent in the sensitivity analysis in the revised Hg Risk TSD.

• *Expand the discussion of caveats associated with the fish consumption rates used in the analysis.* The SAB was generally supportive of the consumption rates used, while recommending additional discussion of caveats. We expanded the discussion of uncertainty related to the fish consumption rates to address the caveats identified by the SAB. The uncertainty discussion now explains (1) that high-end consumption rates for South Carolina reflect small sample sizes, and therefore may be more uncertain, (2) that the consumption surveys underlying the studies are older (*i.e.*, mostly based on survey data from the 1990s) and behavior may have changed (*i.e.*, consumption rates may have changed since the surveys were conducted), and (3) that consumption rates used in the Hg Risk TSD are annualized rather than seasonal rates and thus contribute little to overall uncertainty. None of these sources of uncertainty is associated with a particular directional bias (*e.g.*, neither *systematically higher nor lower risk)*

• *Verify whether the consumption rates are daily values expressed as annual averages and whether they are "as caught" or "as prepared."* We carefully reviewed the studies underlying the fish consumption rates used in the Hg Risk TSD and verified that the rates are annual averages of the daily consumption rates and that they represent as prepared estimates. We also expanded the explanation of the exposure calculations to describe more completely the exposure factors and equation used to generate the average

daily MeHg intake estimates for the subsistence scenarios.

- *Explain the criteria for exclusion of fish less than 7 inches in length from analysis.* We provided the rationale for the 7-inch cutoff for edible fish used in the Hg Risk TSD. Seven inches represents a minimum size limit for a number of key edible freshwater fish species established at the state level. For example, Pennsylvania establishes 7 inches as the minimum size limit for both trout and salmon (other edible fish species such as bass, walleye and northern pike have higher minimum size limits). The impact of the 7-inch cutoff is likely to be quite small, as only 6 percent of potential fish samples were excluded due to this criterion.
- *Identify the number of watersheds excluded from the analysis due to the criterion for excluding watersheds with less than 25 members of a source population.* The SAB was generally supportive of the approach used for identifying watersheds with the potential for subsistence activity, while recommending additional information on the results of applying the approach. We added a figure to illustrate the number of watersheds with fish tissue Hg data used to model risk for each of the subsistence fishing scenarios. For all scenarios except the female subsistence fishing scenario, the exposure scenarios significantly limited the number of watersheds. Because the female subsistence fishing scenario does not differentiate with regard to ethnicity or socio-economic status (SES), we applied this scenario to all regions of the country and to all watersheds with fish tissue Hg data. This reflects our assumption that, given the generalized nature of the female subsistence fishing scenario, it is reasonable to assume that it could po-

tentially occur at any watershed with fish tissue Hg data. The female subsistence fishing scenario included in the revised risk assessment is similar to the high-consuming female scenario included in the Hg Risk TSD.[32] However, the female subsistence fishing scenario is applied to all watersheds, while in the scenario for the high-consuming low-income female angler, we only evaluated watersheds with a population of at least 25 low-income females. The female subsistence fishing scenario provides greater coverage geographically than the high-consuming low-income female scenario. As described in the revised Hg Risk TSD, the EPA made this change in response to SAB's concerns regarding the potential exclusion of watersheds with fewer than 25 individuals and regarding coverage for high-end recreational fish consumption.[33]

• *Enhance the discussion of the assumption of a linear relationship between changes in Hg deposition and changes in fish tissue Hg at the watershed level, including providing citations to more recent studies supporting the proportional relationship between changes in Hg deposition and changes in MeHg fish tissue levels.* The SAB supported the assumption of a linear relationship between changes in Hg deposition and changes in fish tissue Hg at the watershed level, while recommending additional supporting language. We expanded our discussion of the scientific basis for

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[32] In the Revised Hg Risk TSD, this population is also referred to as the "typical female subsistence consumer."

[33] This change led to a very small increase in the number of watersheds with populations potentially at-risk. In the Hg Risk TSD accompanying the proposed rule, approximately 4 percent of modeled watersheds were excluded based on the SES-based filtering criteria.

the proportionality assumption and added citations for the more recent studies supporting the assumption. We also expanded the discussion of uncertainties associated with this assumption, including uncertainties related to the potential for sampled fish tissue Hg level to reflect previous Hg deposition, and the potential for non-air sources of Hg to contribute to sampled fish tissue Hg levels. Each of these sources of uncertainty may result in potential bias in the estimate of exposure associated with current deposition. If the fish tissue Hg levels are too high due to either previous Hg deposition or non-air sources of Hg, then the absolute level of exposure attributed to both total Hg deposition and U.S. EGU-attributable Hg deposition will be biased high. However, the percent contribution from U.S. EGUs will not be affected as it depends entirely on deposition. The EPA took steps to minimize the potential for these biases by (1) only using fish tissue Hg samples from after 1999, and (2) screening out watersheds that either contained active gold mines or had other substantial non-U.S. EGU anthropogenic emissions of Hg. The SAB concluded that the EPA's approach to minimizing the potential for these biases to affect the results of the Hg Risk TSD is sound. In addition, we conducted several sensitivity analyses to gauge the impact of excluding watersheds with the potential for non-EGU Hg loading. We found that the estimates of the percent of modeled watersheds with populations potentially at-risk were largely insensitive to these exclusions, suggesting that any potential biases from including watersheds with potential non-air Hg loadings are likely to be small.

- *Additional sources of variability should be discussed in terms of the degree to which they are reflect-*

ed in the design of the risk assessment and the impact that they might have on risk estimates. These include: (1) The geographic patterns of populations of subsistence fishers, including how this factor interacts with the limited coverage we have for watersheds with our fish tissue Hg data, (2) the protocols used by states in collecting fish tissue Hg data, (3) body weights for subsistence fishing populations and the impact that this might have on exposure estimates, and (4) preparation and cooking methods which affect the conversion of fish tissue Hg levels (as measured) into "as consumed" values. We expanded the discussion of sources of variability in the revised Hg Risk TSD to more fully address these sources of variability. The Hg Risk TSD quantitatively reflected many aspects of variability, including spatial and temporal variability in Hg emissions, Hg deposition, fish tissue Hg levels, and subsistence behavior. After evaluating the aspects of variability assessed qualitatively in the Hg Risk TSD such as temporal response in fish tissue, we do not believe that quantitatively incorporating any of these aspects would substantially change the risk results given the stated goal of the analysis to identify watersheds where potential exposures to MeHg from self-caught fish consumption could exceed the RfD.

- *Additional sources of uncertainty should be discussed in terms of their potential impact on risk estimates. These include: (1) Emissions inventory used in projecting total and U.S. EGU-attributable Hg deposition, including the projection of reductions in U.S. EGU emissions for the 2016 scenario, (2) air quality modeling with CMAQ including the prediction of future air quality scenarios, (3) ability of the Mercury Maps-based approach for relating Hg deposition*

to MeHg in fish to capture Hg hotspots, (4) the limited coverage that we have with fish tissue Hg data for watersheds in the U.S. and implications for the Hg Risk TSD, (5) the preparation factor used to estimate "as consumed" fish tissue Hg levels, (6) the proportionality assumption used to relate changes in Hg deposition to changes in fish tissue Hg levels at the watershed-level, (7) characterization of the spatial location of subsistence fisher populations (including the degree to which these provide coverage for high-consuming recreational fishers), and (8) application of the RfD to low SES populations and concerns that this could low-bias the risk estimates. We expanded the discussion of sources of uncertainty presented in the revised TSD to address more fully these sources of uncertainty and the potential impact on risk estimates. Regarding these eight additional sources of uncertainty, we have (1) evaluated the uncertainties in the emissions and determined that while an important source of uncertainty, we are not able to quantify emissions uncertainty in the risk analysis, but have determined that the emissions inventories and emissions models represent the best available methods for predicting Hg emissions in the U.S., (2) evaluated the uncertainties in the Hg deposition predictions and determined that while an important source of uncertainty, we are not able to quantify uncertainty in Hg deposition in the Hg Risk TSD. Moreover, the CMAQ model used to estimate deposition is based on peer reviewed science and represents the best available method for predicting Hg deposition in the U.S., (3) evaluated the ability of the Mercury Maps-based approach for relating Hg deposition to MeHg in fish to capture Hg hotspots and determined that while finer resolution deposition modeling might reveal addi-

tional areas with elevated deposition, the 12 kilometer (km) deposition modeling matches well with the watershed size selected for the analysis, and thus the use of 12 km deposition estimates with the Mercury Maps based approach will not be a large source of uncertainty, (4) evaluated the limited coverage that we have with fish tissue Hg data for watersheds in the U.S. and implications for the Hg Risk TSD and based on the SAB's recommendations, we supplemented the coverage of watersheds by obtaining additional fish tissue Hg samples for areas heavily impacted by U.S. EGU deposition, thus reducing the uncertainty in the analysis, (5) evaluated the uncertainty in the preparation factor and determined that the level of uncertainty is low, and as such would have minimal impact on the risk estimates, (6) evaluated the uncertainty resulting from the proportionality assumption used to relate changes in Hg deposition to changes in fish tissue Hg levels at the watershed-level, and determined, based both on quantitative sensitivity analyses and qualitative assessments, that this source of uncertainty is not likely to greatly influence the results, and is not likely to have a specific directional bias, (7) evaluated the uncertainty related to characterization of the spatial locations of subsistence populations and determined that uncertainty could be reduced by focusing the risk estimates on female subsistence fishing populations, which are assumed to have the potential to fish in all watersheds, in response to SAB's concerns regarding potential exclusion of watersheds with fewer than 25 individuals and (8) evaluated the potential impact of the uncertainty in application of the RfD to low SES populations. The EPA determined that due to the method used in calculating the

RfD, we have confidence that the RfD provides protection for low SES populations.

- *Expand the sensitivity analyses (over those included in the original risk assessment) to address uncertainty related to the use of the 75th percentile fish tissue Hg value (at each watershed) as the core risk estimate.* Based on the SAB's recommendation, we added a sensitivity analysis using the median fish tissue Hg estimate (at the watershed level). This sensitivity analysis showed that use of the median fish tissue Hg concentration instead of the 75th percentile resulted in a relatively small decrease (*i.e.*, 10 percent) in the estimates of watersheds with populations potentially at-risk, and did not substantially change the conclusions *of the risk assessment.*

C. Summary of Results of Revised Hg Risk TSD of Risks to Populations With High Levels of Self-Caught Fish Consumption

Based on the recommendations we received from the SAB, we revised the quantitative analysis of risk to subsistence fishing populations with high levels of fish consumption. Our revision to the quantitative risk results reflects three key recommendations from the SAB, including (1) addition of 824 watersheds based on additional fish tissue Hg sample data we obtained from states and the National Listing of Fish Advisories, (2) application of a 0.95 adjustment factor to the reported fish tissue Hg concentrations to account for the fraction that is MeHg, and (3) inclusion of all watersheds with fish samples that meet the filtering criteria [34] in representing potential exposures

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[34] The watersheds were filtered to exclude watersheds that: (a) Were not freshwater, (b) did not have fish sampling data

associated with increased risk of neurologic health effects for female subsistence fishing populations.

Based on these revisions, our estimates of the number and percent of modeled watersheds with populations potentially at-risk from exposure to EGU-attributable MeHg changed from those presented in the preamble to the proposed rule.[35] For the 99th percentile consumption scenario, the number of watersheds with fish tissue Hg samples where subsistence fishing populations may be at-risk from exposure to EGU-attributable MeHg increased from 672 to 917 (an increase of 36 percent). For this same scenario, the total percent of modeled watersheds with populations potentially at-risk from either risk metric (*i.e.*, MeHg exposure from U.S. EGUs alone exceeds the RfD or total MeHg exposure exceeds the RfD and U.S. EGUs contribute at least 5 percent) increased from 28 percent estimated at proposal to 29 percent after addressing SAB recommendations. The

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since 2000, (c) did not have fish larger than 7 inches in length, (d) contained active gold mines or (e) had substantial non-air Hg loading.

[35] Since the time of the analyses conducted in support of the proposed rule, the EPA updated IPM modeling to reflect the most recently available information, including public comments and the final CSAPR (see IPM Documentation for further details on these updates, which is available in the docket). Compared to the modeling conducted at proposal, these updates are projected to result in greater reductions in criteria pollutants, and also to have a slightly greater impact on U.S. EGU Hg emissions. Based on the revised projection for 2016, the EPA estimates that U.S. EGUs would emit 27 tons of Hg, as compared to the 29 tons we modeled for the Hg Risk TSD. We do not expect this 2 ton difference to substantially change the mercury risks reported in the preamble to the proposed rule, as this represents less than a 10 percent reduction in Hg emissions.

increase in the total percent of modeled watersheds with populations potentially at-risk using the expanded geographic coverage of watersheds provides additional confidence that emissions of Hg from U.S. EGUs pose a hazard to public health. For the 99th percentile consumption scenario, the percent of modeled watersheds with populations potentially at-risk from total potential exposures to MeHg that exceed the RfD and U.S. EGUs contribute at least 5 percent increased from 22 percent to 24 percent. For the 99th percentile consumption scenario, the percent of modeled watersheds with populations potentially at-risk based on Hg deposition from U.S. EGUs alone decreased from 12 percent to 10 percent.

The additional sensitivity analyses conducted in response to the SAB peer review showed that the estimates of the percent of modeled watersheds with populations potentially at-risk are robust to alternative assumptions about both the watersheds included in the analysis and the selection of the 50th percentile or 75th percentile fish tissue Hg level. Sensitivity analyses excluding entire states with the potential for historical loadings of Hg from non-air sources [36] resulted in an increase from 29 percent to 33 percent in the total percent of modeled watersheds with populations potentially at-risk exceeding either risk metric (*i.e.*, U.S. EGUs alone or total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent). Including only watersheds

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[36] The SAB noted that areas with substantially elevated fish tissue Hg levels could also be characterized by lakes and rivers with high natural methylation rates, and thus some of the states we excluded for this sensitivity analysis might not have fish tissue Hg levels that reflect non-U.S. EGU Hg loadings.

in the top 25th percentile of U.S. EGU deposition resulted in an increase in the total percent of modeled watersheds with populations potentially at-risk exceeding either risk metric, from 29 percent to 30 percent. Using the 50th percentile fish tissue Hg level resulted in a decrease in the total percent of modeled watersheds with populations potentially at-risk exceeding either risk metric, from 29 percent to 26 percent. On balance, these sensitivity analyses do not substantially reduce the percent of modeled watersheds with populations potentially at-risk, and thus confirm the finding that Hg emissions from U.S. EGUs pose a hazard to public health. In fact, given the broader coverage of modeled watersheds in the revised analysis, we have even greater confidence in our finding that Hg emissions from U.S. EGUs pose a hazard to public health.

D. Peer Review of the Approach for Estimating Cancer Risks Associated With Cr and Ni Emissions in the U.S. EGU Case Studies of Cancer and Non-Cancer Inhalation Risks for Non-Hg HAP and EPA Response

As explained in the preamble to the proposed rule, the EPA submitted for peer review its characterization of the chemical speciation for the emissions of Cr and Ni used in the non-Hg HAP inhalation risk case studies. The remaining aspects of the non-Hg HAP case study risk assessments used methods that were previously peer reviewed. Specifically, the methodologies used to conduct the non-Hg case studies are consistent with those used to conduct inhalation risk assessments under EPA's Risk and Technology Review (RTR) program. Because the RTR assessments are considered to be highly influential science as-

sessments, the methodologies used to conduct them were subject to a peer review by the SAB in 2009. The SAB issued its peer review report in May 2010.[37] The report endorsed the risk assessment methodologies used in the program, and made a number of technical recommendations for EPA to consider as the RTR program evolves.

The EPA's case studies identified Cr and Ni emissions as the key drivers of the estimated inhalation cancer risks for EGUs. Because these results hinged on specific scientific interpretations of data used to characterize EGU emissions of Cr and Ni, the EPA conducted a letter peer review of its analysis and interpretation of those data relative to the quantification of inhalation risks associated with Cr and Ni emissions from U.S. EGUs. The following sections describe the peer review process, enumerate the peer review charge questions presented to the peer review panel, summarize the key recommendations from the peer review, and summarize our responses to those recommendations.

1. Summary of Peer Review Process

The EPA asked three independent, external peer reviewers representing government, academic and the private sector to review of the methods for devel-

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[37] U.S. Environmental Protection Agency— Science Advisory Board (U.S. EPA–SAB). 2010. *Review of EPA's draft entitled, "Risk and Technology Review (RTR) Risk Assessment Methodologies: For Review by the EPA's Science Advisory Board with Case Studies—MACT I Petroleum Refining Sources and Portland Cement Manufacturing". EPA–SAB–10–007. May. Available on-line at: http://yosemite.epa.gov/sab/sabproduct.nsf/4AB3966E263D943A8525771F00668381/$File/EPA-SAB-10-007-unsigned.pdf.*

oping inhalation cancer risk estimates associated with emissions of Cr and Ni compounds from coal- and oil-fired EGUs in support of the appropriate and necessary finding. The approaches and rationale for the technical and scientific considerations used to derive inhalation cancer risks were summarized in the draft document entitled, "Methods to Develop Inhalation Cancer Risk Estimates for Chromium and Nickel Compounds." The peer reviewers received several charge questions (three questions on Cr and two questions on Ni, which are provided below) on the technical and scientific relevance of the approaches used to develop the inhalation unit risk estimates. The EPA also provided information on Cr speciation profiles for different industrial sources, as well as information on the Ni speciation of PM from oil-fired EGUs.

2. Peer Review Charge Questions

Below, we present the charge questions posed to the peer reviewers to help guide their review and development of recommendations to EPA on key issues relevant to the characterization of risks from EGU emissions containing either Cr or Ni compounds.

The EPA asked three questions regarding Cr and Cr compounds:

Question 1: Do EPA's judgments related to speciated Cr emissions adequately take into account the available Cr speciation data?

Question 2: Has EPA selected the species of Cr (*i.e.*, hexavalent Cr, Cr(VI)) that accurately represents the toxicity of Cr and Cr compounds?

Question 3: Are the assumptions used in past analysis scientifically defensible, and are there alternatives that EPA should consider for future analysis?

The EPA asked two questions regarding Ni and Ni compounds:

Question 1: Do EPA's judgments related to speciated Ni emissions adequately take into account available speciation data, including recent industry spectrometry studies?

Question 2: Based on the speciation information available and on what we know about the health effects of Ni and Ni compounds, and taking into account the existing Unit Risk Estimates (URE) values (*i.e.*, values derived for EPA's Integrated Risk Information System (IRIS), California Environmental Protection Agency (Cal EPA) and Texas Commission on Environmental Quality (TCEQ)), the EPA has provided several approaches[38] to derive unit risk estimates that may be more scientifically defensible than those used in past analyses. Which of the options presented would result in more accurate and defensible characterization of risks from exposure to Ni and Ni compounds? Are there alternative approaches that EPA should consider?

3. Summary of Peer Review Findings and Recommendations

Regarding Cr and Cr compounds, all three reviewers considered Cr(VI) as the species likely to be driving cancer risks based on solid evidence from the

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[38] See section 3.3 of U.S. Environmental Protection Agency (U.S. EPA). 2011c. *Methods to Develop Inhalation Cancer Risk Estimates for Chromium and Nickel Compounds*. Office of Air Quality Planning and Standards. October.

health effects database for Cr and Cr compounds. All three authors also considered EPA's use of the average of the range of the available speciation data (*i.e.*, 12 percent and 18 percent Cr(VI) contained in coal- and oil-fired EGUs, respectively) as a reasonable approach for the derivation of default speciation profiles to be used when there is no speciation data available. All reviewers agreed that there is high uncertainty associated with the variability in the speciation data available for Cr (*e.g.*, range of approximately 4 to 23 percent Cr(VI) from coal-fired units). One of the reviewers recommended several additional studies for EPA's consideration; the EPA considered these in finalizing the report.

Regarding Ni and Ni compounds, the reviewers agreed with the views of the international scientific bodies, which consider Ni compounds carcinogenic as a group. One reviewer recommended that the EPA review several additional Ni speciation data that suggests that sulfidic Ni compounds (which the reviewer considered as the most potent carcinogens within the group of all Ni compounds) are present at low levels in emissions from EGUs. In addition, this reviewer pointed out that there is a recently proposed model that may explain the differences in carcinogenic potential across Ni compounds.

4. The EPA's Responses to Peer Review Recommendations

We summarize EPA's basic responses to the peer review comments below, first for Cr-related issues,

and second for Ni-related issues, which are reflected in the revised document.[39]

a. Cr and Cr Compounds

In agreement with the peer reviewers and based on the health effects information available for Cr, the EPA assigns high confidence in the assumption that Cr(VI) is the carcinogenic species driving the risk of Cr-emitting facilities. In agreement with the reviews, the EPA considers derivation of default speciation profiles based on the mass of Cr(VI) a reasonable approach. As suggested by one of the reviewers, the EPA reviewed two potentially relevant studies, one of which showed coal combustion emissions containing as much as 43 percent Cr(VI),[40] which suggests that the EPA's quantitative approach could actually underestimate Cr(VI) inhalation risks. However, the other study reviewed by EPA on speciation of Cr in coal combustion showed Cr(VI) percentage levels close to detection limits (*i.e.*, 3 to 5 percent of total Cr, which was close to the limit of detection in this study).[41] Thus, the more recent speciation data available is unlikely to reduce the uncertainty of the Cr speciation analyses used by EPA as the bases for risk characterization analysis.

In agreement with the peer reviewers, the EPA also recognizes that the confidence in the default specia-

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[39] U.S. EPA, 2011c.

[40] Galbreath KC, Zygarlicke CJ. 2004. "Formation and chemical speciation of arsenic-, chromium-, and nickel-bearing coal combustion $PM_{2.5}$," *Fuel Process Technol* 85:701–726.

[41] Huggins FE, Najih M, Huffman GP. 1999. "Direct speciation of chromium in coal combustion by-products by X-ray absorption fine structure spectroscopy," *Fuel Process Technol* 78:233–242.

tion profiles is low because the profiles are based on a limited data set with a wide range of percentages of Cr(VI) across the different samples.

b. Ni and Ni Compounds

Based on the views of the major scientific bodies mentioned above and the peer reviewers that commented on EPA's approaches to risk characterization of Ni compounds, the EPA considers all Ni compounds to be carcinogenic as a group and the EPA does not consider Ni speciation or Ni solubility to be strong determinants of Ni carcinogenicity. These scientific bodies also recognize that based on the data available, the precise Ni compound(s) responsible for the carcinogenic effects in humans is not always clear, and that there may be differences in the potential toxicity and carcinogenic potential across Ni compounds. Nevertheless, studies in humans indicate that various mixtures of Ni compounds (including Ni sulfate, sulfides and oxides, alone or in combination) encountered in the Ni refining industries may cause cancer in humans, and there is no reason to expect anything different from this for mixtures of Ni compounds from other emission sources. One of the reviewers suggested we consider views by some authors that believe that water soluble Ni, such as Ni sulfate, should not be considered a human carcinogen. This view is based primarily on a negative Ni sulfate 2-year rodent bioassay by the National Toxicology Program (NTP) (which is different from the positive 2-year NTP bioassay for Ni subsulfide).[42] [43] [44]

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[42] Oller A. 2002. "Respiratory carcinogenicity assessment of soluble nickel compounds." *Environ Health Perspect.* 110:841–844.

One review article identifies the discrepancies between the animal and human data (*i.e.*, from studies of cancers in workers inhaling certain forms of Ni versus inhalation studies suggesting different carcinogenic potential in rodents with different Ni compounds) and states that the epidemiological data available clearly support an association between Ni and increased cancer risk, although the article acknowledges that the data are weakest regarding water soluble Ni. In addition, the EPA identified a recent review[45] that highlights the robustness and consistency of the epidemiological evidence across several decades showing associations between exposure to Ni and Ni compounds (including Ni sulfate) and cancer.

Regarding the second charge question on Ni compounds, two reviewers suggested using the URE derived by the TCEQ[46] for all Ni compounds as a group, rather than the one derived by the Integrated Risk

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[43] Heller JG, Thornhill PG, Conard BR. 2009. "New views on the hypothesis of respiratory cancer risk from soluble nickel exposure; and reconsideration of this risk's historical sources in nickel refineries." *J Occup Med Toxicol.* 4:23.

[44] Goodman JE, Prueitt RL, Thakali S, and Oller AR. 2011. "The nickel iron bioavailability model of the carcinogenic potential of nickel-containing substances in the lung." *Crit Rev Toxicol* 41:142–174.

[45] Grimsrud TK and Andersen A. "Evidence of carcinogenicity in humans of water-soluble nickel salts." *J Occup Med Toxicol.* 2010. 5:1–7. Available online at *http://www.ossupmed.com/content/5/1/7.*

[46] Texas Commission on Environmental Quality (TCEQ). 2011. *Development Support Document for nickel and inorganic nickel compounds. Available online at http://www.tceq.state.tx.us/assets/public/implementation/tox/dsd/final/june11/nickel_&_compounds.pdf.*

Information System (IRIS, 1991) [47] specifically for Ni subsulfide. The third reviewer did not comment on an alternative approach. Considering this, to develop our primary risk estimate, the EPA decided to use a health protective approach by applying 100 percent of the current IRIS URE for Ni subsulfide, rather than assuming that 65 percent of the total mass of emitted Ni might be Ni subsulfide, as used in previous analyses. We used the IRIS URE value because IRIS values are preferred given the conceptual consistency with EPA risk assessment guidelines and the level of peer review that such values receive. We used 100 percent of the IRIS value because of the concerns about the potential carcinogenicity of all forms of Ni raised by the major national and international scientific bodies, and recommendations of the peer reviewers. Nevertheless, taking into account that there are potential differences in toxicity and/or carcinogenic potential across the different Ni compounds, and given that two URE values have been derived for exposure to mixtures of Ni compounds that are two to three fold lower than the IRIS URE for Ni subsulfide, the EPA also considers it reasonable to use a value that is 50 percent of the IRIS URE for Ni subsulfide for providing an estimate of the lower end of a plausible range of cancer potency values for different mixtures of Ni compounds.

Although this report focused primarily on cancer risks associated with emissions containing Ni compounds, it is important to note that comparative quantitative analyses of non-cancer toxicity of Ni

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[47] U.S. EPA, 1991. *Integrated Risk Information Service (IRIS) assessment for nickel subsulfide.* Available at: *http://www.epa.gov/iris/subst/0273.htm.*

compounds indicate that Ni sulfate is as toxic or more toxic than Ni subsulfide or Ni oxide which does not support the notion that the solubility of Ni compounds is a strong determinant of its toxicity.[48] [49]

E. Summary of Results of Revised U.S. EGU Case Studies of Cancer and Non-Cancer Inhalation Risks for Non-Hg HAP

Based on the results of the peer review and public comments on the non-Hg case study chronic inhalation risk assessment, we made several changes to the emissions estimates, dispersion modeling, and risk characterization for the modeled case study facilities. Key changes include (1) changes in emissions, (2) changes in stack parameters for some facilities based on new data received during the public comment period, (3) use of updated versions of AERMOD and its input processors (AERMAP, AERMINUTE, and AERMET), and (4) use of 100 percent of the current IRIS URE for Ni subsulfide to calculate Ni-associated inhalation cancer risks (rather than assuming that the Ni might be 65 percent as potent as Ni subsulfide).

Based on estimated actual emissions, the highest estimated individual lifetime cancer risk from any of the 16 case study facilities was 20 in a million, driven by Ni emissions from the one case study facility with

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[48] Haber LT, Allen BC, Kimmel CA. 1998. "Non-Cancer Risk Assessment for Nickel Compounds: Issues Associated with Dose-Response Modeling of Inhalation and Oral Exposures." *Toxicol Sci.* 43:213–229.

[49] National Toxicology Program (NTP). 1996. *Technical Report Series No. 454, Toxicology and carcinogenesis studies of nickel sulfate hexahydrate.* July. Available online at http://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr454.pdf.

oil-fired EGUs. Of the facilities with coal-fired EGUs, five facilities had maximum individual cancer risks greater than one in a million[50] (the highest was five in a million), with the risk from four due to emissions of Cr(VI) and the risk from one due to emissions of Ni.[51] There were also two facilities with coal-fired EGUs that had maximum individual cancer risks equal to one in a million. All of the facilities had noncancer Target Organ Specific Hazard Index (TOSHI)[52] values less than one, with a maximum TOSHI value of 0.4 (also driven by Ni emissions from the one case study facility with oil-fired EGUs).

Since these case studies do not cover all facilities in the category, and since our assessment does not include the potential for impacts from different EGU facilities to overlap one another (*i.e.*, these case studies only look at facilities in isolation), the maximum risk estimates from the case studies likely underestimates true maximum risks for the source category.

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[50] A risk level of 1 in a million implies a likelihood that up to one person, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the specific concentration over 70 years (an assumed lifetime). This would be in addition to those cancer cases that would normally occur in an unexposed population of one million people.

[51] When the lower end of the cancer potency range for Ni was used to develop risk estimates, 5 of the 16 facilities had maximum cancer risks exceeding 1 in a million, and the maximum individual cancer risk for any single facility fell to 10 in a million.

[52] The target-organ-specific hazard index (TOSHI) is a metric used to assess whether there is an appreciable risk of deleterious (noncancer) effects to a specific target organ due to continuous inhalation exposures over a lifetime. If a TOSHI value is less than or equal to one, such effects are unlikely. For TOSHI values greater than one, there is an increased risk of such effects.

Based on the fact that six U.S. EGUs were estimated to meet or exceed the CAA section 112(c)(9) criterion of one in a million, EGUs cannot be removed from the list of source categories to be regulated under CAA section 112.

F. Public Comments and Responses to the Appropriate and Necessary Finding

1. Legal Aspects of Appropriate and Necessary Finding

a. History of Section 112(n)(1)(A)

Comment: One commenter provided a detailed history of EPA's regulatory actions concerning EGUs and implementation of CAA section 112(n)(1)(A). The same commenter implies that the EPA's 2000 appropriate and necessary finding and listing of EGUs was flawed because the Agency did not comply with CAA section 307(d) rulemaking process. The commenter sought review of the 2000 notice in the U.S. Court of Appeals for the District of Columbia Circuit, which was dismissed by the D.C. Circuit. *Utility Air Regulatory Group* v. *EPA*, No. 01–1074 (D.C. Cir. July 26, 2001). The commenter then characterizes at length the 2005 EPA action that revised the interpretation of CAA section 112(n)(1)(A) and, which the D.C. Circuit concluded illegally removed EGUs from the CAA section 112(c) list of sources that must be regulated under CAA section 112. *See New Jersey* v. *EPA*, 517 F.3d 574 (D.C. Cir. 2008). The commenter notes that the D.C. Circuit did not rule on the legal correctness or the sufficiency of the factual record supporting EPA's 2000 listing decision or on the factual correctness of EPA's later decision to reverse its CAA section 112(n)(1)(A) determination. The commenter not-

ed further that the D.C. Circuit indicated that the listing decision could be challenged when the Agency issued the final CAA section 112(d) standards pursuant to CAA section 112(e)(4). The commenter concluded by asserting that the Agency could not ignore the history associated with the regulation of EGUs under section 112 and that two earlier dockets—Docket ID. No. A–92–55 and Docket ID. No. EPA–HQ–OAR–2002–0056—are also part of this long rulemaking effort and must be accounted for in conjunction with Docket No. EPA–HQ–OAR–2009–0234 if all pertinent material and comments are to be part of the rulemaking record.

Response: The commenter characterizes the regulatory history of the rule EPA proposed on May 3, 2011. To the extent that characterization is inconsistent with the lengthy regulatory history EPA provided in the preamble to the May 3, 2011 rule, we disagree. We address several of the statements in more detail below.

First, the commenter makes much of the fact that the EPA did not go through CAA section 307(d) notice and comment rulemaking when making the appropriate and necessary finding and listing decision in 2000. However, the commenter's complaint is without foundation. The CAA does not require CAA section 307(d) rulemaking for listing decisions. In fact, CAA section 112(e)(4) specifically provides that listing decisions may only be challenged "when the Administrator issues emission standards for such * * * [listed] category." Second, the commenter challenged the listing decision in the U.S. Court of Appeals for the District of Columbia Circuit (Court) and, on July 26, 2001, the Court granted EPA's motion to dismiss

that action based on the plain language of CAA section 112(e)(4). Moreover, in addition to the 2000 notice, the EPA clearly articulated its basis for listing EGUs in this proposed rule, which is consistent with CAA section 307(d), and the commenter was provided an ample opportunity to comment. Finally, the commenter asserts that the rulemaking docket for this action is incomplete because the Agency did not include two earlier dockets—Docket ID. No. A–92– 55 and Docket ID. No. EPA–HQ–OAR–2002–0056—for the Section 112(n) Revision Rule, 70 FR 15994 (March 29, 2005), and the reconsideration of the Section 112(n) Revision Rule, 71 FR 33388 (June 9, 2006), respectively. The commenter is incorrect because EPA incorporated by reference the two dockets at issue. *See* EPA–HQ–OAR–2009–0234–3056.

Comment: One commenter stated that the EPA has assessed the public health risks posed by HAP emissions from coal- and oil-fired EGUs for the last 40 years. According to the commenter, throughout that time, the EPA has come to a single repeated conclusion that HAP emissions from EGUs pose little or no risk to public health. Based on this conclusion, the EPA has properly chosen not to require EGUs to install expensive, new pollution control equipment to control HAP emissions. The commenter asserts that, in this proposed rule, the EPA shifts its opinion on the health impacts of EGU HAP emissions 180 degrees and now seeks to impose sweeping regulatory requirements on all power plants. According to the commenter, the EPA's newfound concern about HAP emissions from EGUs is not based on new and different assessments of the public health consequences of EGU HAP emissions but instead on health benefits from the reduction of non-hazardous air pollutants,

primarily PM, which the Agency is required to regulate under other provisions of the CAA. One commenter stated that for decades, the EPA set primary ambient air quality standards that protect public health with an adequate margin of safety, CAA section 109(b)(1), and set secondary standards that are [sic] "requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air," CAA 109(b)(2). The commenter notes that even if EPA now views those past PM standards as inadequate, the EPA has ongoing regulatory proceedings in which it can address any perceived health concerns. The commenter concludes that regulation of EGU HAP emissions under CAA section 112 is an unlawful way to address those concerns.

Response: The commenter is incorrect in its assertion that the Agency has consistently concluded that HAP emissions from EGUs do not present a hazard to public health. In the 2000 finding, the Agency concluded that HAP emissions from coal- and oil-fired EGUs do pose a hazard to public health and determined that it was appropriate and necessary to regulate such units under CAA section 112. As a result of that finding, the EPA added coal- and oil-fired EGUs to the CAA section 112(c) list of source categories for which emission standards are to be established pursuant to CAA section 112(d). Further, in support of the proposed rule, the EPA conducted additional extensive quantitative and qualitative analyses, which confirm that it remains appropriate and necessary to regulate EGUs under CAA section 112. Among other things, those analyses demonstrate that emissions from coal- and oil-fired EGUs continue to pose a hazard to public health. The commenter also fails to

note that the EPA found that HAP emissions from EGUs pose a hazard to the environment as well.

The commenter seems confused about the basis for the Agency's appropriate and necessary finding because it maintains that the EPA made the appropriate and necessary finding based on the health co-benefits attributable to PM reductions that will be achieved as a result of the Agency's regulation of HAP emissions from EGUs. Nowhere in the May 2011 proposal does EPA state that it based the appropriate and necessary finding on hazards to public health attributable to PM emissions. The commenter's allegation lacks foundation. The appropriate and necessary finding unmistakably focuses on the hazards to public health and hazards to the environment associated with HAP emissions from EGUs.

Comment: One commenter stated that CAA section 112 required EPA to make a risk-based determination in order to regulate HAP. According to the commenter, the EPA may regulate substances "reasonably * * * anticipated to result in an increase in mortality or increase in serious illness" to a level that protects public health with an "ample margin of safety." According to the commenter, the EPA has regulated a number of HAP emitted from industrial source categories other than EGUs.

As for EGUs, according to the commenter, the EPA found that the combustion of fossil fuels produces extremely small emissions of a broad variety of substances that are present in trace amounts in fuels and that are removed from the gas stream by control equipment installed to satisfy other CAA requirements. The commenter stated that the EPA, in past reviews, found that these HAP emissions did not pose

hazards to public health. *See* 48 FR 15076, 15085 (1983) (radionuclides). The commenter further stated that "[i]n the case of Hg specifically, the EPA found that "coal-fired power plants * * * do not emit mercury in such quantities that they are likely to cause ambient mercury concentration to exceed" a level that "will protect public health with an ample margin of safety." 40 FR 48297–98 (October 19, 1975) (Hg); 52 FR 8724, 8725 (March 19, 1987) (reaffirming Hg conclusion).

According to the commenter, in the late 1980s, the EPA was concerned that its prior risk assessments of individual HAP emissions from fossil-fuel-fired power plants may not reflect the total risks posed by all HAP emitted by those sources. The commenter states that the EPA modeled the risks posed by all HAP emitted by power plants (very much like the analyses the Agency would conduct for the Utility Study ten years later). The commenter asserts that the modeling again failed to identify threats to public health that warranted regulation under an "ample margin of safety" test.

Response: The commenter's statements concerning the pre-1990 CAA are not relevant to the current action. Congress enacted CAA section 112(n)(1) as part of the 1990 amendments to the Act. That provision requires, among other things, that the Agency evaluate the hazards to public health posed by HAP emissions from fossil-fuel fired EGUs. Had Congress concluded, as commenter appears to assert, that HAP emissions from EGUs did not pose a hazard to public health or the environment, it defies reason that Congress would have required EPA to conduct the three studies at issue in CAA section 112(n)(1) (titled "Elec-

tric utility steam generating units") and regulate EGUs under section 112 if the Administrator determined in her discretion that it was appropriate and necessary to do so. The Agency complied with the statutory mandates in CAA section 112(n)(1) in conducting the studies and reasonably exercised its discretion in making the appropriate and necessary finding.

We acknowledge that Congress treated radionuclide emissions from EGUs differently. For radionuclides from EGUs (and certain other sources), Congress included CAA section 112(q)(3), which authorizes but does not require the Agency to maintain the regulations of radionuclides in effect prior to the 1990 amendments. The fact that Congress made an exception for radionuclides and no other HAP from EGUs further demonstrates that the HAP-related actions EPA took with regard to EGUs prior to the 1990 amendments to the CAA are not germane.

As for the commenter's statements about Hg emissions from EGUs, we find their conclusions wholly inconsistent with CAA section 112(n)(1). That provision is titled "Electric utility steam generating units," and it directs EPA to conduct two Hg-specific studies. *See* CAA sections 112(n)(1)(B) and 112(n)(1)(C). The commenter's suggestion that the EPA could or should rely on assessments of Hg from EGUs conducted prior to the 1990 amendments is not tenable.

Finally, the commenter stated that the EPA conducted a risk assessment of all HAP from EGUs prior to the 1990 amendments and that the Agency did not identify any HAP that failed the "ample margin of safety" test. The commenter did not cite the study or provide any information to support the statements so

we are unable to respond to the alleged study directly; however, the risk assessments conducted in support of the appropriate and necessary finding, as well as the 2000 finding, demonstrate that HAP emissions from EGUs pose hazards to public health and the environment.

b. Interpretation of "Appropriate" and "Necessary"

Comment: One commenter stated that in the preamble to the proposed rule, the EPA sets out its "interpretation of the critical terms in CAA section 112(n)(1)," arguing that this latest interpretation is "wholly consistent with the CAA" and with the Agency's earlier "2000 finding." *See* 76 FR 24976, 24986 (May 3, 2011). The commenter stated that throughout the proposal EPA tries to suggest that it is returning to some earlier, "correct" interpretation of CAA section 112(n)(1) set forth in its 2000 action. *See, e.g.*, 76 FR 24989 ("The Agency's interpretation of the term 'appropriate' * * * is wholly consistent with the Agency's appropriate finding in 2000"); id. at 24992 ("Our interpretation of the necessary finding is reasonable and consistent with the 2000 finding"). According to the commenter, the EPA did not provide in 2000 any interpretation of what it now characterizes as the "critical terms" of section 112(n)(1). *See, e.g.*, 70 FR 15999 n.13 (the "2000 finding does not provide an interpretation of the phrase 'after imposition of the requirements of the Act' "); id. at 16000/2 (in 2000, the EPA "did not provide an interpretation of the term 'appropriate' "); 76 FR 24992 (the "Agency did not expressly interpret the term necessary in the 2000 finding"). The commenter believes that for that reason alone, it is impossible to credit EPA's asser-

tion that it "appropriately concluded that it was appropriate and necessary to regulate hazardous air pollutants * * * from EGUs" in 2000, and that it is today merely "confirm[ing] that finding and conclud[ing] that it remains appropriate and necessary to regulate these emissions.* * *" [53]

Response: The commenter disagrees with certain statements in the preamble to the proposed rule that provide that the Agency's interpretation of CAA section 112(n)(1) is reasonable and consistent with the 2000 finding. It is difficult to decipher the exact complaint that the commenter has with EPA's proposed rule in this regard, but the commenter does assert that "the Agency did not provide in 2000 any interpretation of what it now characterizes as the "critical terms" of CAA section 112(n)(1)." The commenter's assertion lacks foundation. Although the 2000 finding did not provide detailed interpretations of the regulatory terms at issue, it discussed the types of considerations relevant to the appropriate and necessary inquiry. For example, it is clear that in 2000, the Agency was concerned with the then current hazards to public health and the environment when assessing whether it was appropriate to regulate EGUs under section 112.[54] In addition, when evaluating whether it was necessary to regulate utilities, the Agency stated that it was necessary to regulate HAP emissions from U.S. EGUs under section 112 because the implementation of the other requirements of the Act would not adequately address the serious public health and environmental hazards arising from HAP emissions from EGUs. The Agency also specifically

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[53] *Id.* at 24,977/3.

[54] 65 FR 79830.

noted that "section 112 is the authority intended to address" hazards to public health and the environment posed by HAP emissions. *Id.*

The detailed interpretation set forth in the preamble to the proposed rule is consistent with the 2000 finding, but EPA does not assert that the interpretation is in any way necessary to support the factual conclusions reached in the 2000 finding. Instead, we noted in the preamble to the proposed rule that our interpretation is consistent with the 2000 finding because in 2005 we interpreted the statute in a manner that was not consistent with the 2000 finding. The commenter has provided no legal support for its position that the Agency erred in interpreting the statute in a manner that is consistent with a prior factual finding.

Comment: Several commenters assert that in the 1990 amendments to the Clean Air Act, Congress directed the EPA to base its determination regarding regulation of fossil-fuel-fired generating units on consideration of any adverse public health effects identified in the study mandated by the first sentence of section 112(n)(1)(A) and that Congress did not dictate in section 112(n)(1)(A) that the EPA must regulate electric utility steam generating units under section 112.

According to the commenters the sponsor of the House bill that became section 112(n)(1)(A) provides an explanation that contradicts the EPA's approach to regulating EGUs:

> Pursuant to section 112(n), the Administrator may regulate fossil fuel fired electric utility steam generating units only if the studies de-

> scribed in section 112(n) clearly establish that emissions of any pollutant, or aggregate of pollutants, from such units cause a significant risk of serious adverse effects on the public health. Thus, * * * he may regulate only those units that he determines—after taking into account compliance with all provisions of the act and any other Federal, State, or local regulation and voluntary emission reductions—have been demonstrated to cause a significant threat of serious adverse effects on the public health.

136 Cong. Rec. H12,934 (daily ed. Oct. 26, 1990) (statement of Rep. Michael Oxley).

The commenters stated that the EPA position is premised on the assumption that "regulation under section 112" necessarily means "regulation under 112(d)" and falsely premised on the assumption that source categories listed by operation of section 112(n)(1)(A) cannot be regulated differently. The commenters conclude that the language of section 112(n)(1)(a) reflects Congress' intent that "regulation of HAP from EGUs was not intended to operate under section 112(d) but was instead intended to be tailored to the findings of the utility study mandated by section 112(n)(1)(A)."

Response: The commenters maintain that the Agency's interpretation of CAA section 112(n)(1) is flawed in many respects. The primary support for one commenter's arguments against EPA's interpretation, including in the comment above, is legislative history in the form of statements from one Congressman, Representative Oxley. The Supreme Court has repeatedly stated that the statements of one legislator alone should not be given much weight.

See Brock v. *Pierce County*, 476 U.S. 253, 263 (1986) (finding that "statements by individual legislators should not be given controlling effect, but *when they are consistent with the statutory language and other legislative history, they provide evidence of Congress' intent.*") (*emphasis added*) (citation omitted); *Garcia, et al.*, v. *U.S.*, 469 U.S. 70, 78 (1984), citing *Zuber* v. *Allen*, 396 U.S. 168, 187 (1969) (reiterating its prior findings, the Court indicated that isolated statements "are 'not impressive legislative history.' "); *Weinberger, et al.*, v. *Rossi et al.*, 456 U.S. 25, 35 (declining to make a ruling based on "one isolated remark by a single Senator"); *Consumer Product Safety Comm., et al.* v. *GTE Sylvania, Inc., et al.*, 447 U.S. 102, 117–118 (1980) (declining to give much weight to isolated remarks of one Representative); *Chrysler Corp.* v. *Brown, et al.*, 441 U.S. 281, 311 (1979) (finding that "[t]he remarks of a single legislator, even the sponsor, are not controlling in analyzing legislative history."); *Zuber*, 396 U.S. at 186 (concluding that "[f]loor debates reflect at best the understanding of individual Congressmen."); and *U.S.* v. *O'Brien*, 391 U.S. 367, 384 (1968) (in evaluating the statements of a handful of Congressmen, the Court concluded that "[w]hat motivates one legislator to make a speech about a statute is not necessarily what motivates scores of others to enact it. * * *."). As these cases show, the Supreme Court does not give weight to the statements of an individual legislator, except when the statements are supported by other legislative history and the clear intent of the statute. The commenters cited no case law that would support reliance on such limited legislative history.

The commenter has not cited any other legislative history to support Representative Oxley's statement,

and the lack of additional support makes the statement of little utility or import under the case law. In fact, there does not appear to be anything in the House, Senate, or Committee Reports that supports Oxley's statement. The lack of support for Oxley's statement in the Committee Report is particularly telling since, as the commenter notes, the House and Senate bills required different approaches to regulating EGUs under section 112, with the Senate bill requiring EGUs be regulated prior to the Utility Study. In fact, legislative statements from Senator Durenberger, a supporter of the Senate version, demonstrate that others would almost certainly not have agreed with Oxley's interpretation. For example, Senator Durenberger stated, "It seems to me inequitable to impose a regulatory regime on every industry in America and then exempt one category, especially a category like power plants which are a significant part of the air toxics problem."

Senator Durenberger discussed the negotiations with the Administration and the industry push to avoid regulation, including industry arguments for not regulating Hg from U.S.-EGUs:

> The utility industry continued to adamantly oppose [regulation under section 112]. First, they argued that mercury isn't much of an environmental problem. But as the evidence mounted over the summer and it became clear that mercury is a substantial threat to the health of our lakes, rivers and estuaries and that power plants are among the principal culprits, they changed their tactic. Now they are arguing that mercury is a global problem so severe that just cleaning up U.S. power plants won't make

> enough of a difference to be worth it. They've gone from 'we're not a problem' to 'you can't regulate us until you address the whole global problem.' Recasting an issue that way is not new around here. So, it is not a surprise. But it does suggest the direction in which this debate will be heading in the next few years.

136 Cong. Rec. 36062 (October 27, 1990).

Senator Durenberger also explained why the House version was adopted:

> Given that a resolution of the difficult issues in the conference were necessary to conclude work on this bill, the Senate proposed to recede to the House provision which was taken from the original administration bill. It provides for a 3-year study of utility emissions followed by regulation to the extent that the Administrator finds them necessary.

Id.

Senator Durenberger's statements indicate that it is unlikely that he would agree with Oxley's interpretation of CAA section 112(n)(1), a provision that provides the Agency with considerable discretion, and nothing indicates that others in the Senate (or for that matter anyone else in the House) would agree with that interpretation. Given the Supreme Court's views on the use of such limited legislative history, the EPA reasonably declined to consider (or even discuss) the legislative history in the preamble to the proposed rule and we believe it would be improper to ascribe Representative Oxley's statements to the entire Congress.

Moreover, Representative Oxley's statement directly conflicts with the statutory text. Representative Oxley stated that "[the Administrator may regulate only those units that he determines—*after taking into account compliance with all provisions of the act and any other Federal, State, or local regulation and voluntary emission reductions*—have been demonstrated to cause a significant threat of serious adverse effects on the public health." 136 Cong. Rec. H12934 (daily ed. Oct. 26, 1990), reprinted in 1 1990 Legis. Hist. at 1416–17 *(emphasis added)*. However, the Utility Study required under CAA section 112(n)(1)(A) directs the Agency to consider the hazards to public health reasonably anticipated to occur after "imposition of the requirements of [the Clean Air Act]." EPA was not required to consider state or local regulations or voluntary emission reduction programs in the Utility Study, and that study is the only condition precedent to making the appropriate and necessary finding.[55]

The legislative history the commenters rely on is not controlling. The Agency believes that it has reasonably interpreted section 112(n)(1)(A), for all the reasons described herein and in the proposal. The commenters also cite Representative Oxley's statements as support for alternative interpretations of

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[55] In addition, the EPA only considered CAA requirements in the Utility Study and this was the correct approach because Congress knew how to require consideration of non-Federal requirements when directing EPA to conduct a study or assessment. See CAA section 112(n)(5) (Congress required EPA to conduct an assessment of hydrogen sulfide from oil and gas extraction activities and provided that the assessment "shall include review of existing State and industry control standards, techniques and enforcement.").

CAA section 112(n)(1). We believe that any arguments that rely on such limited legislative history are without merit.

Comment: One commenter stated that the EPA does acknowledge that, in many significant respects, its new interpretation of CAA section 112(n)(1) "differs from that set forth" in the Agency's 2005 rulemaking, but argues that its change of position is permissible. *See* 76 FR 24988/1 ("[T]o the extent our interpretation differs from that set forth in the 2005 Action, we explain the basis for that difference and why the interpretation, as set forth in this preamble, is reasonable."). In support, commenters note that the EPA cites *National Cable & Telecommunication Ass'n* v. *Brand X Internet Services,* 545 U.S. 967 (2005). The commenters agree that it is true that, in *Brand X Internet Services,* the Supreme Court explained that, if an agency "adequately explains the reasons for a reversal of policy," such change is "not invalidating," since the "whole point of Chevron is to leave the discretion provided by the ambiguities of a statute with the implementing agency." 545 U.S. at 981 (internal quotations omitted). The commenters maintain that all Brand X Internet Services was saying is that "[a]gency inconsistency is not a basis for declining to analyze the agency's interpretation under the *Chevron* framework." *Id.*

According to the commenter, it is not enough that the EPA has purported to "explain" why it has abandoned the interpretation of CAA section 112(n)(1) adopted in 2005. The commenter states that under the first step of *Chevron*, the Agency's latest interpretation must still be consistent with congressional intent. *See Chevron* v. *NRDC,* 467 U.S. at 842–43. The

commenters state that under the second step of Chevron, if there is discretion for EPA to exercise in interpreting the "critical terms" of CAA section 112(n)(1), the Agency must properly define the range of that discretion and then act reasonably in exercising that discretion. *See Chevron,* 467 U.S. at 843; *see also Village of Barrington, Ill.* v. *Surface Transportation Bd.,* No. 09–1002 (D.C. Cir. Mar. 15, 2011). The commenters allege that the EPA failed to properly define and exercise the scope of its discretion. In each instance, the commenter maintains that the Agency has departed from the correct interpretation of CAA section 112(n)(1) that it adopted in 2005, seizing instead upon a new approach that is contrary to the plain language of the CAA itself, as interpreted after considering the statements of Representative Oxley.

Response: The commenter appears to argue that the EPA's interpretation of CAA section 112(n)(1) is not consistent with the plain language of the statute, implying that the statute is clear and must be evaluated under step one of Chevron. *See Chevron* v. *NRDC,* 467 U.S. 837 842–42 (1984) (finding that when the legislative intent is clear no additional analysis is required). However, as noted above, much of the commenter's argument that the plain language of the statute precludes EPA's interpretation is based on the unpersuasive legislative history discussed above. As explained in the preamble to the proposed rule, the statute directs the Agency to determine whether it is appropriate and necessary to regulate EGUs under section 112. As the D.C. Circuit has held, the terms "appropriate" and "necessary" are very broad terms. Because these terms are broad they are susceptible to different interpretations. We

believe we have reasonably interpreted the appropriate and necessary language in section 112(n)(1)(A). To the extent that interpretation differs from the one set forth in 2005, we have fully explained the basis for such changes. *See* 76 FR 24986–24993 (setting forth the Agency's interpretation of section 112(n)(1)).

Furthermore, we properly considered the scope of our discretion in interpreting the statute as explained in detail in the preamble to the proposed rule. We believe the interpretation set forth in the preamble to the proposed rule is consistent with the Act and, therefore, the Agency should be afforded deference pursuant to *National Cable & Telecommunication Ass'n* v. *Brand X Internet Services,* 545 U.S. 967 (2005).

Comment: A number of commenters agreed with the Agency's interpretation of section 112(n)(1) and the terms appropriate and necessary. The commenters also agreed that the EPA's interpretation of that provision was reasonable and consistent with the statute.

Response: We agree with the commenters and appreciate their support.

Comment: One commenter asserts that the EPA's ultimate motivation for rejecting its prior interpretation of CAA section 112(n)(1) and embracing this flawed new approach is made clear from the very outset of the proposal. According to the commenter, the EPA touts the fact that "one consequence" of the MACT rule would be that the "market for electricity in the U.S. will be more level" and "no longer skewed in favor of the higher polluting units that were exempted from the CAA at its inception on Congress'

assumption that their useful life was near an end." *See* 76 FR 24979/2. The MACT rule would "require companies to make a decision—control HAP emissions from virtually uncontrolled sources" or else "retire these sometimes 60 year old units and shift their emphasis to more efficient, cleaner modern methods of generation, including modern coal-fired generation." Id.

The commenter stated that this remarkably forthright statement establishes that the underlying basis for EPA's proposal to regulate EGUs under CAA section 112 is not to address any "hazards to public health" that might be attributed to the emission by EGUs of HAP listed under CAA section 112(b). Rather, according to commenter, the EPA is utilizing the regulation of EGUs under CAA section 112 as a means to an entirely different end: To force the imposition of controls that will also have the result of reducing non-HAP emissions (primarily PM) or force the shutdown of those units for which the cost of such controls would be prohibitive. At the same time, according to commenter, the EPA tacitly acknowledges that it cannot hope to make out a case that the regulation of EGU HAP emissions is "appropriate and necessary" within the meaning of CAA section 112(n)(1). The commenter asserts that the only HAP whose health-related benefits EPA quantifies is Hg. Elsewhere, the commenter stated that the EPA contends there are "additional health and environmental effects" attributable to HAP other than Hg, but admits that it has "not quantified" those risks due supposedly to "insufficient information." *See* 76 FR 24999/2. With respect to Hg the commenter stated that the benefits are so questionable and miniscule, some $4 million to $6 million (given a 3 percent dis-

count rate), that compared to the total social costs of the rule (*i.e.*, nearly $11 billion) the rule cannot be justified were EPA properly to interpret CAA section 112(n)(1) and undertake the sort of regulatory analysis Congress intended. The commenter stated that the reason that the EPA touts in this rulemaking the health benefits EPA attributes to the reduction of non-hazardous air pollutants (again, primarily PM), the regulation of which is authorized under provisions of the CAA apart from CAA section 112, is to elide the inconvenient truth regarding the truly trivial nature of the benefits attributable to HAP regulation itself. The commenter concludes that the EPA distorts CAA section 112(n)(1)(A) "beyond all recognition."

One commenter stated that the EPA is directed by CAA section 112(n)(1)(A) to study the "hazards to public health anticipated to occur as a result of emissions" by EGUs of "pollutants listed under subsection (b) of this section"—*i.e.*, HAP and HAP alone. Thereafter, the EPA is authorized to regulate EGU HAP emissions if, and only if, they determine that "such regulation" of HAP emissions is "appropriate and necessary" to address the "hazards to public health" that may be attributable to HAP emissions. According to the commenter, by contrast, in this rulemaking, the EPA has seized upon the fact that the control of EGU HAP emissions will also control non-HAP (such as PM), and then seeks to justify the regulation of HAP emissions based almost entirely on the health benefits of the reductions in non-HAP emissions that would be coincidentally achieved. The commenter believes that this "regulatory sleight-of-hand" runs afoul of congressional intent and is unlawful.

Response: The commenter alleges that the health-related benefits to regulating HAP emissions from EGUs are "questionable and miniscule," and that the only real benefits stem from non-HAP emissions, such as PM. The commenter also implies that regulation of HAP is nothing more than a straw man and that the Agency's ultimate goal is to regulate other pollutants, and specifically PM. These allegations are wholly without merit. The Agency has conducted comprehensive technical analyses that confirm that HAP emissions from EGUs pose a hazard to public health. The analyses are discussed at length elsewhere in this final rule, and a review of the proposed and final rules utterly refutes commenter's assertion that PM reductions form the basis for the appropriate and necessary finding. In addition, the commenter appears to ignore the Agency's findings concerning the hazards to public health and the environment posed by HAP emissions simply because the Agency is not able to quantify many of the benefits associated with reductions of HAP emissions from EGUs or because the estimated HAP benefits that are quantified are small in relation to the co-benefits achieved through reductions in non-HAP air pollutants, such as PM and SO_2, which are surrogates for certain HAP. The Agency is regulating EGUs pursuant to section 112(d) for all of the reasons explained in the preamble and discussed elsewhere in this response to comments. The commenter fails to recognize that the statute neither requires a cost-benefit analysis prior to finding it appropriate and necessary to regulate EGUs, nor requires such analysis prior to setting emission standards. Indeed, Congress expressly precluded consideration of costs when setting MACT floors. As explained below, the EPA does not believe

that it is appropriate to consider costs when determining whether to regulate EGUs under CAA section 112.

Comment: One commenter stated that the EPA has ignored the language and intent of CAA section 112(n)(1)(A), as interpreted based on Representative Oxley's statements, and that the Agency's interpretation of this provision violates step one of Chevron. Under Chevron where the "intent of Congress is clear," that is the "end of the matter," for both the implementing agency and a reviewing court "must give effect to the unambiguously expressed intent of Congress." Chevron, 467 U.S. at 842–43. The commenter asserts that the legislative history of CAA section 112(n)(1)(A) "sheds considerable light on Congress' unique approach to regulation of EGUs under CAA § 112." According to the commenter, on April 3, 1990, the Senate passed S. 1630. The Senate bill would have required EPA to list EGUs under CAA section 112(c) and to regulate them under the MACT provisions of CAA section 112(d). *See* S. 1630 section 301, 3 1990 Legis. Hist. at 4407. Thereafter, the House of Representatives passed a modified version of S. 1630 on May 23, 1990. This House version substantially changed the provisions of CAA section 112 as they applied to EGUs. *See* 1 1990 Legis. Hist. at 572–73. The House version was virtually identical to the current CAA section 112(n)(1)(A), and was ultimately adopted by the conference committee, enacted by Congress and signed into law. According to the commenter, Congress expressly rejected the "list-under-(c)-and-regulate-under-(d)" approach that S. 1630 would have applied to EGUs, and that Congress did choose to apply to other source categories. The commenter stated that the EPA's interpretation that

the Agency is "required to establish emission standards for EGUs consistent with the requirements set forth in section 112(d)" (Id. at 24,993/3) fails to take the legislative history into account, and in a footnote, the commenter states that the Agency erred by not addressing the legislative history as it did in the 2005 action.

Response: For the reasons stated above, we believe commenter's reliance on the single statement of one legislator is flawed. In addition, in a footnote the commenter stated that the EPA recognized "that it had to address" the legislative history in its 2005 action, and that the EPA erred in this case because we did not address the legislative history. The commenter cites no case law to support its contention that an Agency must "address" unpersuasive legislative history. Further, in the 2005 action, the EPA relegated to a footnote the Oxley statement that commenter relies on so heavily even though the statement supported the interpretation we provided in that rule. We recognized then what the commenter fails to recognize now, which is that the Agency cannot argue that the meaning of CAA section 112(n)(1)(A) is clear based on the statements of one legislator.

Furthermore, the Agency's interpretation does not violate Chevron Step 1. The terms "appropriate" and "necessary" are ambiguous. The statements of a lone legislator do not transform those ambiguous words into a Chevron Step 1 situation.

Moreover, the commenter's assertion that Congress unambiguously defined the factors to consider in making the appropriate determination is without merit. We fully explain in the preamble to the pro-

posed rule the basis for the Agency's interpretation, and we are not revising that interpretation based on the comments received.

Finally, the EPA notes that the sentence concerning regulation under CAA section 112(d) that the commenter quotes from the preamble states, in full: "Congress did not exempt EGUs from the other requirements of section 112 and, *once listed*, the EPA is required to establish emission standards for EGUs consistent with the requirements set forth in section 112(d), as described above." 76 FR 24993 (*emphasis added*). The EPA discusses requirements to regulate section 112(c) listed sources under section 112(d) in response to other comments.

c. Consideration of Both Environmental Effects and Health Effects From Other Sources

Comment: Several commenters stated that the EPA acts contrary to congressional intent when the Agency considers itself "thereby authorized to consider 'environmental effects' and the effects of HAP emissions from non-EGU sources, in making its 'appropriate and necessary' finding under subparagraph (n)(1)(A)."

Commenters assert that the EPA misreads CAA section 112(n)(1)(B) and (C) to inject environmental effects in the CAA section 112(n)(1)(A) determination. According to one commenter the plain language of CAA section 112(n)(1) establishes that regulation of EGUs is to be predicated solely on "hazards to public health" attributable to HAP emissions. The legislative history providing that the EPA "may regulate [EGUs] only if the studies described in section 112(n) clearly establish that emissions of any pollutant * * *

from such units cause a significant risk of serious adverse risk to the public health" confirms that plain language. *See* Oxley Statement at 1416– 17. The commenter further stated that nothing on the face of CAA section 112(n)(1)(A) indicates that Congress intended that the EPA should (or must) take into account any additional information that might be developed through the other studies mentioned in subparagraphs (n)(1)(B) and (C) (*i.e.*, the Mercury Study[56] and the NAS Study[57]), such as HAP emissions from non-EGU sources. The commenter also identified other provisions of section 112 that specifically require consideration of environmental effects and states that Congress would have requires such consideration in CAA section 112(n)(1) if it had wanted EPA to consider environmental effects.

The commenter makes a related assertion that the EPA acts contrary to congressional intent by assuming authority to assess the "'hazard to public health or the environment [from] HAP emissions from EGUs alone' or the 'result of HAP emissions from EGUs in conjunction with HAP emissions from other sources'" (citing 76 FR at 24,988/1). According to the commenter, the only evident basis for the Agency's interpretation that, in making its "appropriate and necessary" finding, the EPA can (and should) take into account HAP emissions from sources other than EGUs, is that the Mercury Study authorized by CAA 112(n)(1)(B) references "mercury emissions from * * * municipal waste combustion units, and other sources, including area sources," in addition to EGUs. The

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[56] U.S. EPA. 1997. *Mercury Study Report to Congress.* EPA–452/R–97–003. December.

[57] NAS, 2000.

commenter asserts, however, that subparagraph (n)(1)(A) identifies the Utility Study as the sole study to inform EPA's "appropriate and necessary" finding. The commenter states that if Congress had intended that the EPA take into account information developed through the Mercury Study, Congress "would not have specified that the EPA was to predicate its 'appropriate and necessary' finding on the 'results of the study required by this subparagraph' (n)(1)(A)."

Commenter also cites to a number of other section 112 provisions that expressly address environmental effects and the commenter states the only conclusion to draw from the inclusion in those provisions and the absence of such language in section 112(n)(1)(A) is that Congress intended public health to be the only basis for the appropriate and necessary finding.

Response: The commenter again relies in part on the statements of one legislator to attack EPA's reasoned interpretation of an ambiguous statute. To the extent the commenter's arguments rely on this limited evidence, we refer to the response above. As we stated above, CAA section 112(n)(1) is an ambiguous statutory provision; thus, the EPA's interpretation, not commenter's, is entitled to considerable deference if it is a reasonable reading of the statute. *Chevron*, 467 U.S. at 843–44. For the reasons described herein and in the proposal, we believe that we have reasonably interpreted the statutory terms at issue here. The Agency directs attention to section III.A. of the proposed rule, which includes a thorough discussion of the Agency's interpretation of the relevant statutory terms. To the extent the commenters disagree with EPA's interpretations, the EPA refers back to its

discussion in the proposal and responds to the comments as follows.

The commenter appears to maintain that the EPA must interpret the scope of the appropriate and necessary finding solely in the context of the CAA section 112(n)(1)(A) Utility Study, such that only hazards to public health and only EGU HAP emissions may be considered. The commenter incorrectly conflates the requirements for the Utility Study with the requirement to regulate EGUs under CAA section 112 if EPA determines it is appropriate and necessary to do so. The commenter concedes that the Agency may consider information other than that contained in the Utility Study, but only to the extent it relates specifically to hazards to public health directly attributable to HAP emissions from EGUs. We agree that we may consider additional information other than that contained in the Utility Study, as we stated in the preamble to the proposed rule, because courts do not interpret phrases like "after considering the results of" in a manner that precludes the consideration of other information. *See United States* v. *United Technologies Corp.*, 985 F.2d 1148, 1158 (2nd Cir. 1993) ("based upon" does not mean "solely); [58] *see also* 76 FR 24988. We further explained in the preamble to the proposed rule that it was reasonable to

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[58] Several commenters have taken issue with our citation to *United States* v. *United Technologies Corp.* because the language at issue in that case was "based upon" and the language of section 112(n)(1)(A) is "after considering the results of." We believe that, if anything, "based upon" is more prescriptive than "after considering the results of" such that the case supports the Agency's interpretation that additional information other than the Utility Study may be considered in making the appropriate and necessary finding.

interpret the scope of the appropriate and necessary finding in the context of all three studies required under CAA section 112(n)(1) because the provision is title "Electric utility steam generating units."[59] The commenter has provided little more than unpersuasive legislative history to support its restrictive interpretation of our authority. *Id.*

The commenter also argues that the statute clearly prohibits the Agency from considering adverse environmental effects or the cumulative effects of HAP emissions from EGUs and other sources based on its claim that the statute is clear when one *properly* considers the legislative history. Again, the commenter has provided no support for its contention other than the statements of one Representative and the improper conflation of the CAA section 112(n)(1)(A) direction on the conduct of the Utility Study and the appropriate and necessary finding. Congress left it to the Agency to determine whether it is appropriate and necessary to regulate EGUs under CAA section 112 and the statute does not limit the Agency to considering only hazards to public health and only harms directly and solely attributable to EGUs.

The commenter stated that Congress specifically told EPA when it wanted EPA to consider adverse environmental effects in CAA section 112 and cites to several provisions of the Act that require consideration of adverse environmental effects. The commenter ignores CAA section 112(n)(1)(B), which directs the Agency to consider adverse environmental effect. In any event, even were we to view section 112(n)(1)(A) in isolation, as the commenter suggests, we still

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[59] 76 FR 24986–87.

maintain that we can consider adverse environmental effects under 112(n)(1)(A). Nothing in section 112(n)(1)(A) precludes consideration of environmental effects. Congress required the Agency to assess whether it is appropriate and necessary to regulate EGUs under section 112. We believe that adverse environmental effects can be considered in the appropriate analysis. Congress specifically directed the Agency to consider adverse environmental effects when delisting source categories pursuant to section 112(c)(9), and thus we believe it is reasonable to consider such effects when determining whether it is appropriate to regulate such units under section 112, especially given that Congress did not limit our appropriate and necessary inquiry to the Utility Study. See CAA section 112(c)(9)(B)(ii).

Moreover, the other provisions of CAA section 112 that specifically discuss environmental effects have purposes that are distinguishable from CAA section 112(n)(1), and we do not believe one can reasonably draw the conclusion that the commenter does when comparing those provisions to CAA section 112(n)(1)(A). The lack of a requirement to consider environmental effects in CAA section 112(n)(1)(A) does not equate to a prohibition on the consideration of environmental effects as the commenter concludes. The EPA maintains that it reasonably concluded that we should protect against identified or potential adverse environmental effects absent clear direction to the contrary.

Concerning the consideration of the cumulative effect of HAP emissions from EGUs and other sources, we provided a reasonable interpretation of the statute and noted that our interpretation, unlike com-

menters, does not "ignore the manner in which public health and the environment are affected by air pollution. An individual that suffers adverse health effects as the result of the combined HAP emissions from EGUs and other sources is harmed, irrespective of whether HAP emissions from EGUs alone would cause the harm."[60]

d. Finding for All HAP To Be Regulated

Comment: Several commenters stated that for those EGU HAP for which the Agency makes no CAA section 112(n)(1)(A) determination, their regulation under CAA section 112 is not authorized. For example, one commenter maintains that the Agency could regulate HAP emissions from EGUs under CAA section 112(n). Accordingly, to the extent that the EPA reads CAA section 112, as construed by *National Lime Ass'n*, as compelling it to regulate all HAP emitted by EGUs, should the Agency make an "appropriate and necessary" determination under CAA section 112(n)(1)(A) with respect to a single HAP (*e.g.*, Hg), the EPA stands poised to commit a fundamental legal error that will condemn the final rule on review. Cf., *e.g.*, *PDK Laboratories, Inc.*, 362 F.3d at 797–98; *Holland* v. *Nat'l Mining Ass'n*, 309 F.3d at 817 (where an agency applies a Court of Appeals "interpretation * * * because it believed that it had no choice" and that it "was effectively 'coerced' to do so," then the agency "cannot be deemed to have exercised its reasoned judgment").

Response: We do not agree with the commenter's assertion that Congress intended EPA to regulate only those EGU HAP emissions for which an appropri-

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[60] 76 FR 24988.

ate and necessary finding is made, and the commenter has cited no provision of the statute that states a contrary position. The EPA reasonably concluded that we must find it "appropriate" to regulate EGUs under CAA section 112 if we determine that a single HAP emitted from EGUs poses a hazard to public health or the environment. If we also find that regulation is necessary, the Agency is authorized to list EGUs pursuant to CAA section 112(c) because listing is the logical first step in regulating source categories that satisfy the statutory criteria for listing under the statutory framework of CAA section 112. *See New Jersey,* 517 F.3d at 582 (stating that "[s]ection 112(n)(1) governs how the Administrator decides whether to list EGUs. * * *"). As we noted in the preamble to the proposed rule, D.C. Circuit precedent requires the Agency to regulate all HAP from major sources of HAP emissions once a source category is added to the list of categories under CAA section 112(c). *National Lime Ass'n* v. *EPA,* 233 F.3d 625, 633 (D.C. Cir. 2000). 76 FR 24989.

The commenter does not explain its issues with our interpretation of how regulation under section 112 works—*i.e.* making a determination that a source category should be listed under CAA section 112(c), listing the source category under CAA section 112(c), regulating the source category under CAA section 112(d), and conducting the residual risk review for sources subject to MACT standards pursuant to CAA section 112(f). Instead, it asserts that our decision is flawed because the interpretation we provided does not account for all the alternatives for regulating EGUs under section 112, and that we have not properly exercised our discretion leading to a fatal flaw in our rulemaking.

The commenter also ignores the language of section 112(n)(1)(A). As explained in the proposed rule, the use of the terms section, subsection, and subparagraph in section 112(n)(1)(A) demonstrates that Congress was consciously distinguishing the various provisions of section 112 in directing EPA's action under section 112(n)(1)(A). Congress directed the Agency to regulate utilities "under this section," not "under this subparagraph," and accordingly EGUs should be regulated under section 112 in the same manner as other categories for which the statute requires regulation. Furthermore, the D.C. Circuit Court found that section 112(n)(1) "governs how the Administrator decides whether to list EGUs" and that once listed, EGUs are subject to the requirements of section 112. *New Jersey*, 517 F.3d at 583. Indeed, the D.C. Circuit Court expressly noted that "where Congress wished to exempt EGUs from specific requirements of section 112, it said so explicitly," noting that "section 112(c)(6) expressly exempts EGUs from the strict deadlines imposed on other sources of certain pollutants." *Id.* Congress did not exempt EGUs from the other requirements of section 112, and once listed, the EPA is reasonably regulating EGUs pursuant to the standard-setting provisions in section 112(d), as it does for all other listed source categories.

The commenter provided no alternative theory for regulating EGUs under CAA section 112, other than to state that the EPA could regulate under CAA section 112(n)(1). However, even assuming for the sake of argument, that we could issue standards pursuant to CAA section 112(n)(1), we would decline to do because there is nothing in section 112(n)(1)(A) that provides any guidance as to how such standards should be developed. Any mechanism we devised,

absent explicit statutory support, would likely receive less deference than a CAA section 112(d) standard issued in the same manner in which the Agency issues standards for other listed source categories. We would also decline to establish standards under section 112(n)(1) because Congress did provide a mechanism under CAA sections 112(d) and (f) for establishing emission standards for HAP emissions from stationary sources and it is reasonable to use that mechanism to regulate HAP emissions from EGUs.

e. Considering Costs in Finding

Comment: Several commenters assert that the EPA must consider costs in assessing whether regulation of EGUs is appropriate under CAA section 112(n)(1)(A). Commenters posit that the EPA's position that "the term 'appropriate' * * * does not allow for the consideration of costs in assessing whether hazards * * * are reasonably anticipated to occur based on EGU emissions," 76 FR at 24,989/1, does not withstand scrutiny. According to the commenters, the treatment of "costs" under section 112(c) does not support the Agency's position, and the process by which sources may be "delisted" under section 112(c)(9), including no consideration of costs, sheds no light on the circumstances under which it may be "appropriate" to regulate EGUs under section 112(n)(1)(A).

Commenters characterize as "unintelligible" the EPA's position that it is "reasonable to conclude that costs may not be considered in determining whether to regulate EGUs" when "hazards to public health and the environmental are at issue (citing 76 FR at 24989). "Two commenters stated that a natural reading of the term "appropriate" would include the con-

sideration of costs. According to the commenters, something may be found to be "appropriate" where it is "specially suitable," "fit," or "proper." *See* Webster's Third New International Dictionary at 106 (1993). The term "appropriate" carries with it the connotation of something that is "suitable or proper in the circumstances." *See* New Oxford American Dictionary (2d Ed. 2005). Considering the costs associated with undertaking a particular action is inextricably linked with any determination as to whether that action is "specially suitable" or "proper in the circumstances." One commenter notes that in 2005 (70 FR 15994, 16000; March 29, 2005) the EPA used the dictionary definition of "appropriate," as being "especially suitable or compatible" and that it would be difficult to fathom how a regulatory program could be either "suitable" or "compatible" for a given public health objective without consideration of cost.

One commenter asserts that on the face of CAA section 112(n)(1)(A), it is clear that the EPA is expected to consider costs. According to the commenter, that Congress intended that the EPA investigate and consider "alternative control strategies" for emissions as part of the section 112(n)(1) Utility Study when making the "appropriate and necessary" determination refutes the notion that the Agency can, and indeed must, disregard the cost of regulation in making that determination, because the cost of a given emission "control strategy" is a central factor in any evaluation of "alternative" controls.

Further, according to commenters, it is well-settled that CAA regulatory provisions should be read with a presumption in favor of considering costs (citing *Michigan* v. *EPA*, 213 F.3d 663, 678 (D.C. Cir. 2000)),

and the legislative history of section 112(n)(1)(A) confirms that Congress intended EPA to consider costs (citing Oxley Statement at 1417).

Commenters also assert that the EPA falsely represents that it "did not consider costs when making the "appropriate" determination in the EPA's December 2000 notice (76 FR at 24,989/2).

Response: The commenters first take issue with EPA's explanation of why the Agency determined that costs should not be considered in making the appropriate determination. What commenters do not identify is an express statutory requirement that the Agency consider costs in making the appropriate determination. Congress treated the regulation of HAP emissions differently in the 1990 CAA amendments because the Agency was not acting quickly enough to address these air pollutants with the potential to adversely affect human health and the environment. *See New Jersey*, 517 F.3d at 578. Specifically, following the 1990 CAA amendments, the CAA required the Agency to list source categories and nothing in the statute required us to consider costs in those listing decision, and we have not done so when listing other source categories. Thus, it is reasonable to make the listing decision, including the appropriate determination, without considering costs.

The commenters next argue that the Agency is compelled by the statute to consider costs based on a dictionary definition of "appropriate" and the CAA section 112(n)(1)(A) direction to consider alternative control strategies for regulating HAP emissions in the Utility Study.

Concerning the definition of "appropriate", commenters stated:

> Not only is it "reasonable" for EPA to consider costs in determining whether it is "appropriate" to regulate EGU HAP emissions, a natural reading of the term indicates that excluding the consideration of costs would be entirely unreasonable. Something may be found to be "appropriate" where it is "specially suitable," "fit," or "proper." *See* Webster's Third New International Dictionary at 106 (1993). The term "appropriate" carries with it the connotation of something that is "suitable or proper in the circumstances." *See* New Oxford American Dictionary (2d Ed. 2005) at 76. Considering the costs associated with undertaking a particular action is inextricably linked with any determination as to whether that action is "specially suitable" or "proper in the circumstances."

The EPA believes the definition of "appropriate" that the commenters provide wholly support its interpretation and nothing about the definition compels a consideration of costs. It is appropriate to regulate EGUs under CAA section 112 because EPA has determined that HAP emissions from EGUs pose hazards to public health and the environment, and section 112 is "specially suitable" for regulating HAP emissions, and Congress specifically designated CAA section 112 as the "proper" authority for regulating HAP emissions from stationary sources, including EGUs. Section 112 of the CAA is "suitable [and] proper in the circumstances" because EPA has identified a hazard to public health and the environment from HAP emissions from EGUs and Congress di-

rected the Agency to regulate HAP emissions from EGUs under that provision if we make such a finding. Cost does not have to be read into the definition of "appropriate" as commenter suggests. In addition, as stated elsewhere in response to comments, the Agency does not consider costs in any listing or delisting determinations, and the EPA maintains that it is reasonable to assess whether to list EGUs (*i.e.* the appropriate and necessary finding) without considering costs.

The commenters' argument that costs must be considered based on the CAA section 112(n)(1)(A) requirement to "develop and describe alternative control strategies" in the Utility Study is equally flawed. The argument is flawed because Congress did not direct the Agency to consider in the Utility Study the costs of the controls when evaluating the alternative control strategies. In addition, the EPA did not consider the costs of the alternative controls in the Utility Study, as implied by the commenter. Thus, even viewing section 112(n)(1)(A) in isolation, there is nothing in that section that compels EPA to consider costs. For the reasons described herein, we do not believe that it is appropriate to consider costs in determining whether to regulate EGUs under section 112.

Additionally, one commenter attempts to refute EPA's statement in the preamble to the proposed rule that the EPA did not consider costs in the 2000 finding by pointing to the only two mentions of cost in that notice. However, the EPA did not say that costs were not mentioned in the 2000 finding and a review of the regulatory finding will show that costs were not considered in the regulatory finding. 65 FR

79830 (December 20, 2000) ("Section III. What is EPA's Regulatory Finding?").

f. Considering Requirements of the CAA in "Necessary"

Comment: Several commenters disagree with EPA's position that it need consider "only those requirements that Congress directly imposed on EGUs through the CAA as amended in 1990," for which "EPA could reasonably predict HAP emission reductions at the time of the Utility Study." According to the commenters, the statutory language of CAA section 112(n)(1) requires that the EPA consider the scope and effect of EGU HAP emissions after the imposition of all of the "requirements" of the CAA, not just the Acid Rain program. The commenter maintains that it would have been easy enough for Congress in subparagraph 112(n)(1)(A) to specify "after imposition of the requirements of Title IV of this chapter," but Congress did not. The commenters further add that the legislative history confirms that Congress meant something much broader than that, providing that the EPA is authorized to regulate EGUs under CAA section 112 only after "taking into account compliance with all provisions of the act and any other Federal, State, or local regulation and voluntary emission reductions." The commenters stated that the CAA's "requirements" include the submission by states of ozone and fine PM attainment demonstrations, as well as SIP provisions needed to reach attainment of the NAAQS because such provisions could include controls on EGUs to reduce SO_2 and NO_X, which controls could also result in a reduction in Hg emissions.

Response: The commenter's characterization of the facts is flawed and its reliance on legislative history that is in direct conflict with the express terms of the statute is unpersuasive.

On the facts, the EPA explained in the preamble to the proposed rule its interpretation of the phrase "after imposition of the requirements of [the Act]" as it related to the conduct of the Utility Study.[61] We reasonably concluded that, since Congress only provided 3 years after enactment to conduct the study, the phrase referred to requirements that were directly imposed on EGUs through the CAA amendments and for which the Agency could reasonably predict co-benefit HAP emission reductions. *Id.* The EPA did not state that the phrase only applied to the Acid Rain program, as commenter asserts, and the Utility Study in fact discussed other regulations, including the NSPS for EGUs and revised NAAQS. With regard to the latter, the EPA ultimately determined that it could not sufficiently quantify the reductions that might be attributable to the NAAQS because states are tasked with implementing those standards. *See* Utility Study, pages ES–25, 1–3, 2–32. Conversely, commenter's position is that the EPA must consider implementation of *all* the requirements of the CAA, but it does not indicate how in conducting the Utility Study the Agency could have possibly considered co-benefit HAP reductions attributable to all future CAA requirements. The Agency appropriately considered the other requirements of the Act in the Utility Study and considered those requirements in determining that it was neces-

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[61] 76 FR 24990.

sary to regulate coal- and oil-fired EGUs in December 2000.

Although not required, the Agency in the preamble to the proposed rule conducted further analyses in support of the 2000 finding. In doing so, we considered a number of requirements that far exceed what Congress contemplated when enacting CAA section 112(n)(1)(A)), and our analyses still show that it remains necessary to regulate coal- and oil-fired EGUs under section 112. 76 FR 24991.

We maintain that we have reasonably interpreted the requirement to consider the hazards to public health and the environment reasonably anticipated to occur after imposition of the requirements of the Act as explained in the preamble to the proposed rule.[62] In addition, as stated above, we also believe it would be reasonable to find it necessary to regulate HAP emissions from EGUs based on our finding that such emissions pose a hazard to public health and the environment today without considering future reductions that we currently project to occur as the result of imposition of CAA requirements that are not yet effective (*e.g.*, CSAPR).

Moreover, Representative Oxley's statement cited by the commenter is not consistent with the express terms of CAA section 112(n)(1)(A) on this issue. Representative Oxley stated that the EPA was to take "into account compliance with all the provisions of the act and any other Federal, State, or local regulation and voluntary emission reductions," but CAA section 112(n)(1)(A) directs the Agency to consider "imposition of the requirements of this chapter,"

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[62] 76 FR 24990.

which means the CAA. The Agency reasonably focused on the requirements of the Clean Air Act, which are federally enforceable, and declined to include potential future reductions that may be attributable to voluntary emission reduction programs or state and local regulations that have no basis in the Clean Air Act and are not federally enforceable. In addition to the statutory direction not to consider such requirements, the EPA believes it is reasonable not to include potential reductions attributable to such requirements because the Agency cannot assure that such requirements and the attendant HAP reductions will remain absent regulation under section 112. Finally, the commenter implies that EPA's position is that the Agency will only consider requirements of the Act that directly regulate HAP emissions. The EPA never stated or suggested that interpretation and a fair reading of the proposed rule will demonstrate that EPA considered requirements that achieve co-benefit HAP emission reductions, for example the Transport Rule (known as CSAPR).

Comment: One commenter stated that, under CAA section 112, regulating EGUs is permissible only insofar as it is focused, targeted, and predicated on concrete findings by the Agency that such regulation is indeed "necessary." According to the commenter, the EPA construes CAA section 112(n)(1)(A) as permitting it to find that it is "necessary" to regulate EGUs even where the Agency does not actually know whether it is "necessary" to regulate EGUs. Citing the D.C. Circuit, the EPA suggests that "'there are many situations in which the use of the word 'necessary,' in context, means something that is done, regardless of whether it is indispensible,'" in order to "'achieve a particular end.'" 76 FR 24990, quoting

Cellular Telecommunications v. *FCC*, 330 F.3d 502, 510 (D.C. Cir. 2003). The commenter stated that in the "context" of CAA section 112(n)(1)(A), as informed by the relevant legislative history from Representative Oxley, it is clear that regulation of EGU HAP emissions can be considered "necessary" only if EPA were to "clearly establish" that such regulation was effectively "indispensible" to address the identified harm. As EPA concedes that it has made no such determination here, its proposal is fatally flawed for that reason alone.

The commenter further asserts that the EPA erred when it concluded that it may " 'determine it is necessary to regulate under section 112' when the Agency is 'uncertain whether imposition of the requirements of the CAA will address the identified hazards'" (citing 76 FR at 24,991/3). According to the commenter, the EPA "cannot take refuge in its own 'uncertainty' to support a finding that it is 'necessary' to regulate EGUs under section 112, and the Act precludes the EPA from '"err[ing] on the side of regulation"' in face of uncertainty (*id.*). The commenter also implies that the finding was based on non-HAP emissions.

Response: The commenter again relies on the legislative statements of one Representative and asserts that the statements are controlling. The EPA disagrees with commenter and maintains that its interpretation of the term "necessary" is reasonable. 76 FR 24990–92 (Section III.A.2.b of the preamble to the proposed rule contains the EPA's interpretation of the term "necessary".) 76 FR 24990–92 (Section III.A.2.b of the proposed rule contains EPA's interpretation of the term "necessary".) The commenter

also, in a footnote, implies that EPA based the appropriate and necessary finding on non-HAP air pollution. The commenter is wrong as explained in more detail above.

As an initial matter, this comment is only addressing one aspect of the Agency's interpretation of the term necessary. As EPA stated at proposal:

> If we determine that the imposition of the requirements of the CAA will not address the identified hazards, EPA must find it necessary to regulate EGUs under section 112. Section 112 is the authority Congress provided to address hazards to public health and the environment posed by HAP emissions and section 112(n)(1)(A) requires the Agency to regulate under section 112 if we find regulation is "appropriate and necessary." If we conclude that HAP emissions from EGUs pose a hazard today, such that it is appropriate, and we further conclude based on our scientific and technical expertise that the identified hazards will not be resolved through imposition of the requirements of the CAA, we believe there is no justification in the statute to conclude that it is not necessary to regulate EGUs under section 112.

76 FR 24991.

The EPA has determined that the imposition of the requirements of the CAA will not address the hazards to public health or hazards to the environment that EPA has identified; therefore, it is necessary to regulate EGUs under CAA section 112.

The EPA further interpreted the statute to allow the Agency to find that it is necessary to regulate

EGUs under other circumstances, and it is with one of our additional interpretations that commenter takes issue. Specifically, the commenter argues that EPA's interpretation authorizes the Agency to find it necessary to regulate EGUs when we are uncertain it is necessary, but that misconstrues our interpretation and the record. At proposal, the EPA stated:

> In addition, we may determine it is necessary to regulate under section 112 even if we are uncertain whether the imposition of the requirements of the CAA will address the identified hazards. Congress left it to EPA to determine whether regulation of EGUs under section 112 is necessary. We believe it is reasonable to err on the side of regulation of such highly toxic pollutants in the face of uncertainty. Further, if we are unsure whether the other requirements of the CAA will address an identified hazard, it is reasonable to exercise our discretion in a manner that assures adequate protection of public health and the environment. Moreover, we must be particularly mindful of CAA regulations we include in our modeled estimates of future emissions if they are not final or are still subject to judicial review ([*e.g.*], the Transport Rule). If such rules are either not finalized or upheld by the Courts, the level of risk would potentially increase.

Id.

The CAA requires EPA to exercise its discretion in determining whether regulation under section 112 is necessary, and the D.C. Circuit has stated that "there are many situations in which the use of the word 'necessary,' in context, means something that is done, regardless of whether it is indispensible, to achieve a

particular end." *See Cellular Telecommunications & Internet Association, et al. v. FCC*, 330 F.3d 502, 510 (D.C. Cir. 2003). The EPA's interpretation of "necessary" is reasonable in the context of CAA section 112(n)(1)(A).

The commenter stated that EPA concedes that the Agency has not "clearly established" that regulation of HAP emissions under CAA section 112 is "indispensible." The EPA has conceded nothing but, more importantly, the supposed standard that the commenter presents for evaluating whether it is necessary to regulate HAP emissions from EGUs is not required by the statute. Even the limited legislative history on which the commenter incorrectly relies does not espouse such a standard. The commenter specifically takes issue with EPA's statement that the Agency may find it is necessary to regulate EGUs under CAA section 112 if we are "uncertain whether imposition of the other requirements of the CAA will sufficiently address the identified hazards." 76 FR at 24990. The commenter has again misinterpreted the Agency's position by stating that "EPA construes CAA section 112(n)(1)(A) as permitting it to find that it is "necessary" to regulate EGUs even where the Agency does not actually know whether it is "necessary" to regulate EGUs." Instead, the EPA maintains that it may be necessary to regulate EGUs under CAA section 112 if we identify a hazard to public health or the environment that is appropriate to regulate today and our projections into the future do not clearly establish that the imposition of the requirements of the CAA will address the identified hazard in the future. Making a prediction about future emission reductions from a source category is difficult for statutory provisions that do not mandate direct

control of the given source category or pollutants of concern. We maintain that erring on the side of caution is appropriate when the protection of public health and the environment from HAP emissions is not assured based on our modeling of future emissions.

Furthermore, as we stated in the preamble to the proposed rule, we believe it would be reasonable to find it appropriate *and* necessary to regulate EGUs under section 112 today based on a determination that HAP emissions from EGUs pose a hazard to public health and the environment without considering future HAP emission reductions. 76 FR 24991, n.14. We maintain this is reasonable because "Congress could not have contemplated in 1990 that EPA would have failed in 2011 to have regulated HAP emissions from EGU's where hazards to public health and the environment remain." *Id.* The phrase "after imposition of the requirements of [the Act]" as contemplated CAA section 112(n)(1)(A) could be read to apply only to those requirements clearly and directly applicable to EGUs under the 1990 CAA amendments, all of which have been implemented and still hazards to public health and the environment from HAP emissions from EGUs remain.

g. Listing EGUs Under 112

Comment: One commenter stated that even if EPA were to establish under CAA section 112(n)(1)(A) that it is "appropriate and necessary" to regulate HAP emissions from EGUs, regulating those emissions in the form of a MACT standard established pursuant to CAA section 112(d) is contrary to the plain language of the Act. According to the commenter, if EPA proceeds to finalize the proposal and adopts such a

standard, the rule will for this reason alone be "dead-on-arrival". According to the commenter, the EPA apparently believes that its only option in regulating EGU HAP emissions is establishing a MACT standard under CAA section 112(d). In the preamble to its proposal, the commenter states that EPA contends that, "once the appropriate and necessary finding is made," EGUs are then "subject to section 112 in the same manner as other sources of HAP emissions"—*i.e.*, by "listing" EGUs under CAA section 112(c) and adopting a MACT standard under CAA section 112(d). *See* 76 FR 24993/2 (emphasis added). The commenter further stated that, given that Congress "directed the Agency to regulate utilities 'under this section' [*i.e.*, CAA section 112]," EPA continues, it follows that "EGUs should be regulated in the same manner as other categories for which the statute requires regulation." Id. (emphasis added). The commenter asserts that as EPA sees it, because "Congress did not exempt EGUs from the other requirements of section 112," once EGUs were "listed" under CAA section 112(c), the Agency was "required to establish emission standards for EGUs consistent with the requirements set forth in section 112(d)." Id. at 24,993/3 (emphasis added).

The commenter stated that, in support of this reading of the CAA, the EPA invokes the decision of the U.S. Court of Appeals for the D.C. Circuit in *New Jersey* v. *EPA*, 517 F.3d 574 (D.C. Cir. 2008). The commenter further alleged that, according to EPA, the D.C. Circuit has "already held that section 112(n)(1) 'governs how the Administrator decides whether to list EGUs.' " *See* 76 FR 24993/2–3, quoting 517 F.3d at 583. The commenter stated that EPA construes that holding as indicating that, "once

listed, EGUs are subject to the requirements of section 112"— including, the EPA presumes, CAA section 112(d). Id. The commenter stated that elsewhere, the EPA construes CAA section 112(n)(1) (A) as "govern[ing] how the Administrator decides whether to list EGUs for regulation under section 112," and quotes the D.C. Circuit's observation in *New Jersey* that "Section 112(n)(1) governs how the Administrator decides whether to list EGUs; it says nothing about delisting EGUs." *See* 76 FR 24981/2, quoting 517 F.2d at 582.

The commenter asserts that EPA misinterprets the "under this section" language of CAA section 112(n)(1); overstates the significance of the *New Jersey* decision; and, as a consequence, misapprehends the scope of its own discretion to formulate regulatory standards for EGUs under CAA section 112. In light of these errors, the commenter maintains that EPA should withdraw the proposed MACT rule.

One commenter stated that if Congress had intended that EPA regulate EGU HAP emissions only through a MACT standard, Congress could have—and presumably would have—directed the Agency to regulate EGU emissions "under CAA section 112(d)." Thus, the commenter maintained that EPA's authority to regulate EGU HAP emissions is not derived from any particular subsection of CAA section 112. Rather, the commenter stated that EPA is authorized to regulate "under this section"—*i.e.*, CAA section 112 generally—as may be "appropriate and necessary." The commenter stated that there is nothing on the face of CAA section 112(n)(1)(A) that specifies that regulation of EGUs must occur under CAA section 112(d). To the contrary, according to the commenter,

a plain reading of CAA section 112(n)(1)(A), as interpreted based on the Oxley statement, indicates that establishing a MACT standard for EGUs under CAA section 112(d) is not what Congress had in mind at all.

Response: We do not agree with the commenter. The EPA interpreted CAA section 112(n)(1)(A) in a manner that gives meaning to all the words used in the provision. *See NRDC* v. *EPA*, 489 F.3d 1364, 1373 (D.C. Cir. 2007) (admonishing EPA for an interpretation of CAA section 112(c)(9) that ignored certain words and the context in which they were used. The Court stated that "EPA's interpretation would make the words redundant and one of them 'mere surplusage,' which is inconsistent with a court's duty to give meaning to each word used by Congress.") (*citing TRW Inc.* v. *Andrews, 534 U.S. 19, 31, 122 S. Ct. 441, 151 L. Ed. 2d 339 (2001)).* Specifically, in the preamble to the proposed rule, we stated:

> The statute directs the Agency to regulate EGUs under section 112 if the Agency finds such regulation is appropriate and necessary. Once the appropriate and necessary finding is made, EGUs are subject to section 112 in the same manner as other sources of HAP emissions. Section 112(n)(1)(A) provision provides, in part, that: '[t]he Administrator shall perform a study of the hazards to public health reasonably anticipated to occur as a result of emissions by electric utility steam generating units of pollutants listed under subsection (b) of this section after imposition of the requirements of this chapter. * * * The Administrator shall regulate electric utility steam generating units *under this section*,

> if the Administrator finds such regulation is appropriate and necessary after considering the results of the study required *by this subparagraph.*" *Emphasis added.*

In the first sentence, Congress described the study and directed the Agency to evaluate the hazards to public health posed by HAP emissions listed *under subsection* (b) (*i.e.*, CAA section 112(b)). The last sentence requires the Agency to regulate *under this section* (*i.e.*, CAA section 112) if the Agency finds such regulation is appropriate and necessary after considering the results of the study required by this subparagraph (i.e., CAA section 112(n)(1)(A)). The use of the terms "section", "subsection", and "subparagraph" demonstrates that Congress was consciously distinguishing the various provisions of CAA section 112 in directing the conduct of the study and the manner in which the Agency must regulate EGUs if the Agency finds it appropriate and necessary to do so. Congress directed the Agency to regulate utilities "under this section," and accordingly EGUs should be regulated in the same manner as other categories for which the statute requires regulation. *See* 76 FR 24993.

We maintain that our interpretation of the statute gives meaning to all the words, and the commenter's interpretation does not give any particular meaning to the requirement to "regulate under this section [112]". The commenter is correct that Congress could have in CAA section 112(n)(1)(A) directed EPA to regulate HAP from EGUs under CAA section 112(d) after making the appropriate and necessary finding, but the commenter presumes too much when it stated that Congress would have directed the Agency to regulate HAP emissions from EGUs in such a man-

ner if that is what Congress wanted, simply by including the phrase "regulate under this paragraph" or "regulate under this subparagraph" instead of directing the Agency to "regulate under this section". It did not do so.

As we explained in the section II.A. of the proposed rule, CAA section 112 establishes a mechanism to list and regulate stationary sources of HAP emissions. 76 FR 24980–81. Regulation under CAA section 112 generally requires listing under CAA section 112(c), regulation under CAA section 112(d), and, for sources subjected to MACT standards, residual risk regulations under CAA section 112(f) (as necessary to protect human health and the environment with an ample margin of safety). A determination that EGUs should be listed once the prerequisite appropriate and necessary finding is made is wholly consistent with the language of section 112(n)(1)(A), and listed sources must be regulated under CAA section 112(d). *See* CAA section 112(c)(2); *see also New Jersey*, 517 F.3d at 583 (112(n)(1)(A) "governs how the Administrator decides whether to list EGUs").

As noted above, Congress used the terms section, subsection, and subparagraph in section 112(n)(1)(A). The use of these three terms demonstrates that Congress was consciously distinguishing between the various provisions of section 112. Congress directed the Agency to regulate utilities "under this section," and accordingly EGUs should be regulated in the same manner as other categories for which the statute requires regulation.

Furthermore, the flaws in the commenter's interpretation are highlighted by other CAA section 112 provisions wherein Congress provided specific direc-

tion as to the manner of regulation. For example, CAA section 112(m)(6) requires the Administrator to determine "whether the other provisions of *this section* [112] are adequate" and also indicates that "[a]ny requirements promulgated pursuant to this *paragraph* * * * shall only apply to the coastal waters of the States which are subject to [section 328 of the CAA]." (*emphasis added*).

In addition, CAA section 112(n)(3) provides that when the Agency is "promulgating any standard under this section [112] applicable to publicly owned treatment works, the Administrator may provide for control measures that include pretreatment of discharges causing emissions of hazardous air pollutants and process or product substitutions or limitations that may be effective in reducing such emissions." Finally, CAA section 112(n)(5) directs the Agency to assess hydrogen sulfide emissions from oil and gas extraction and "develop and implement a control strategy for emissions of hydrogen sulfide to protect human health and the environment * * * *using authorities under [the CAA] including [section 111] of this title and this section [112].*" (*emphasis added*). We believe these provisions provide ample evidence that Congress knew how to alter or caveat regulation under CAA section 112 when that was its intent. For these reasons, we believe commenter's argument is without merit.

Comment: Two commenters stated that CAA section 112(n)(1)(A) does not specify that regulation of EGUs must proceed under CAA section 112(d). According to the commenter, an argument could be made, therefore, that the CAA accords EPA with the discretion to regulate EGUs using strategies other

than emission standards in CAA section 112(d). The commenters also state that section 112(n)(1)(A) of the CAA requires that EPA "develop and describe" alternative control strategies for emissions which may warrant regulation under CAA section 112. According to the commenters if Congress meant for EPA to have one sole regulatory option, *i.e.*, regulation of EGUs only under CAA section 112(d), then the development of alternative control strategies would be rendered meaningless because under CAA section 112(d)(3), the EPA is required to determine the level of control that is achieved by the best performing existing units for which it has data and then to impose that level of control on all existing units. The commenter further states that the development of "alternative control strategies" has no role to play in this process. One commenter does note that the consideration of "alternative" controls becomes relevant, if at all, only in those circumstances where EPA might seek to establish a "Beyond-the-Floor" MACT standard pursuant to CAA section 112(d)(2).

Response: The commenters are correct that CAA section 112(n)(1)(A) directed the Agency to develop and describe in the Utility Study report to Congress alternative control strategies for HAP emissions from EGUs that may warrant regulation in the Utility Study, but the commenters' interpretation of and conclusion based on that language are both factually and legally inaccurate.

The commenters appear to interpret the word "alternative control strategies" to mean something other than the traditional control technologies and control measures that are used to control HAP emissions from EGUs. We do not believe that is a reasonable

interpretation of the statute, and the Agency did not interpret the statute in that manner when it conducted the Utility Study. In Chapter 13 of the Utility Study, the EPA considered a range of control measures that would reduce the different types of HAP emitted from EGUs. *http://www.epa.gov/ttn/atw/combust/utiltox/eurtc1.pdf.* The EPA considered pre-combustion controls such as coal washing, fuel switching, and gasification; combustion controls such as boiler design; post-combustion controls such as fabric filters, scrubbers, and carbon absorption; and alternative controls strategies such as demand-side management, energy conservation, and use of alternative fuels (*e.g.*, biomass) or renewable energy. The options discussed in the Utility Study for controlling HAP emissions from EGUs are almost universally available to comply with a CAA section 112(d) standard.

Given the manner in which the Agency conducted the Utility Study, the EPA interpreted the statutory direction as a requirement to set forth the potential alternative control options available to EGUs to comply with CAA section 112 standards in the event the Agency determined regulation under section 112 was appropriate and necessary. The EPA's development and discussion in the Utility Study of alternative control strategies for complying with the standards would help prepare EGUs to comply with the standards if promulgated. Thus, the EPA interpreted the direction to address control strategies in the Utility Study as a request to identify the controls available to EGUs for addressing HAP emissions, and such information would, of course, be relevant if EPA determined that such emissions warranted regulation under section 112.

Furthermore, the EPA establishes CAA section 112(d) standards for stationary sources and it is the responsibility of the sources to comply with the standards using any mechanism available, including pre-combustion and post-combustion measures. Also, the establishment of a MACT standard under CAA section 112(d)(2) and (3) is a two-step process. In the first step, the Agency establishes a floor based on the performance of the best controlled unit or units. *See* CAA section 112(d)(3). In the second step, the Agency must consider additional measures that may reduce HAP emissions and adopt such measures if reasonable after considering costs and non-air quality health and environmental effects. *See* CAA section 112(d)(2). Under the second step, the Agency can consider any measure that reduces HAP emissions even if no source in the category is employing the option under consideration. So, even under the commenter's flawed interpretation of "alternative control strategies", the direction in CAA section 112(n)(1)(A) is not a "pointless exercise" for the development of CAA section 112(d) standards as the Agency considers relevant technologies and HAP emission reduction approaches in evaluating whether to set a more stringent beyond the floor standard.

Comment: One commenter points to CAA section 307(d)(1)(C) and notes that CAA section 112(n) is listed among the provision for which the rulemaking requirements of CAA 307(d) apply. Commenter maintains that this inclusion creates an expectation under the statute that EPA may establish regulatory standards under CAA 112(n). The commenter points to CAA sections 112 (n)(1), (n)(3), and (n)(5) and states that those provisions specifically discuss regulation under CAA section 112 and that EPA must ex-

plain why CAA 307(d)(1)(C) states "any regulation under" CAA 112(n) to defend regulation of utilities under section 112(d). The commenter then implies that EPA erred by not even mentioning this provision at proposal.

The commenter also takes issue with EPA's statement in the proposed rule that "use of the terms section, subsection, and subparagraph" "demonstrates that Congress was consciously distinguishing the various provisions of section 112 in directing the conduct of the study and the manner in which the Agency must regulate EGUs," if EPA determines that it is appropriate and necessary to regulate EGUs. See 76 FR at 24,993/2.

One commenter does not agree with the EPA's finding that the word "subsection" in the first sentence of CAA section 112(n)(1)(A) demonstrates that Congress was consciously distinguishing between the various provisions of CAA section 112 in directing the conduct of the study and the manner in which the Agency must regulate EGUs," were the EPA to "find[ ] it appropriate and necessary to do so." *See* 76 FR 24993/2. According to the commenter, the only evident reason that the word "subsection" is used in the first sentence of CAA section 112(n)(1)(A) is because the reference is made to the "pollutants" which the Utility Study is to address—*i.e.*, the "pollutants" that are emitted by EGUs and which are "listed under subsection (b)" of CAA section 112. Similarly, the word "subparagraph" is used in the last sentence of CAA section 112(n)(1)(A) to identify "the study" which the EPA is directed to undertake by subparagraph (A) of CAA section 112(n)(1)—*i.e.*, the Utility Study. That the last sentence of subparagraph

(n)(1)(A) also states that EPA "shall regulate electric utility steam generating units under this section" does not even imply—much less expressly communicate—that regulation "under this section" must mean "regulation under section 112(d)." The commenter stated that Congress was "consciously distinguishing" between the "various provisions of section 112" for the sake of clarity in the drafting of CAA section 112(n).

The commenter also asserts that the EPA mistakenly relies on section 112(c)(6) when the EPA states that "'where Congress wished to exempt EGUs from specific requirements of section 112, it said so explicitly. Congress did not exempt EGUs from the other requirements of section 112,' " and thus the Agency is "'required to establish emission standards for EGUs consistent with the requirements set forth in section 112(d)' " (citing 76 FR at 24,993 (internal quotation omitted)).

According to the commenter, nothing in section 112(c)(6) indicates how (or even whether) EGU HAP emissions should be regulated under section 112; paragraph (c)(6) serves only to reiterate that the regulation of such emissions is to occur (if at all) as is provided by section 112(n)(1). The commenter also asserts that the EPA mistakenly relies on *New Jersey*. According to the commenter, the D.C. Circuit in that case did not indicate that the language of section 112(c)(6) should, or could, be construed to mean that EGUs must be regulated under a MACT standard adopted pursuant to section 112(d).

Response: The commenter makes a number of arguments that appear to take issue with the EPA's determination that EGUs should be regulated under

CAA section 112(d) if the Agency determines that regulation of HAP emissions from such units is appropriate and necessary. The commenter implies that the EPA erred because alternative mechanisms for regulation of EGUs under CAA section 112 might exist. We do not agree.

The commenter's argument that the EPA erred because we did not explain why section CAA section 307(d)(1)(C) contemplates regulations under CAA section 112(n) is without merit. It is correct that the Agency believes EGUs should be regulated in the same manner as other sources if the appropriate and necessary finding is made because of the structure of CAA section 112. Nothing in CAA section 112(n)(1) requires or implies that the Agency should or must establish standards for EGUs under that provision. Furthermore, unlike CAA sections 112(n)(3) and 112(n)(5) that commenter cites, CAA section 112(n)(1)(A) does not provide any guidance concerning the manner in which EPA is authorized or required to regulate sources under CAA section 112. *See* CAA section 112(n)(3) (specifically authorizing identified control measures and other requirements for consideration in issuing standards under CAA section 112); see also CAA section 112(n)(5) (directing the Agency to develop and implement a control strategy for emissions of hydrogen sulfide using any authority available under the CAA, including sections 112 and 111, if regulation is appropriate). For these reasons, we disagree that any error occurred because we did not specifically discuss in this proposed rule whether we could or should regulate EGUs under CAA section 112(n)(1) instead of CAA section

112(d).[63] The Agency validly listed EGUs in 2000 and listed sources must be regulated pursuant to CAA section 112(d).

Even if we agreed that regulation under CAA section 112(n)(1) was a viable option for EGUs, we would still have listed and regulated EGUs like other sources because CAA section 112(d) provides a statutory framework for regulating HAP emissions from sources and CAA section 112(n)(1) does not. We believe that even if CAA section 112(n)(1) were available to regulate EGUs, there would be sufficient uncertainty about the legal vulnerability of such an approach to caution against employing it. This legal uncertainty would be particularly troubling in light of the fact that we have identified hazards to public health and the environment from HAP emissions from EGUs that warrant regulation, and these regulations are long overdue.

The commenter also takes issue with our statement in the preamble to the proposed rule that the use of the words "section", "subsection", and "subparagraph" in CAA section 112(n)(1)(A) "demonstrates that Con-

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[63] We note that in our January 2004 proposed rule, we solicited comment on whether section 112(n)(1)(A) provided independent authority to regulate EGUs. We received several comments on this issue, and we rejected the concept after reviewing the comments and further considering the language of section 112(n)(1)(A) and the structure of section 112. As such, we proposed and are finalizing that once the Agency determines that it is appropriate and necessary to regulate EGUs under section 112, those sources are listed pursuant to subsection 112(c), as we did in December 2000, and the Agency must set standards for those sources pursuant to section 112(d). See section 112(c) and (d)(1) (requiring establishment of 112(d) standards for listed source categories).

gress was consciously distinguishing the various provisions of section 112 in directing the conduct of the study and the manner in which the Agency must regulate EGUs." *See* 76 FR 24993. The commenter appears to make much of our use of the word "must" in that sentence and also states that our interpretation of the significance of the use of the three terms in CAA section 112(n)(1)(A) is flawed because Congress only used the three terms for purposes of clarity. The commenter is incorrect on both points. With respect to the commenter's concern regarding the use of the word "must" in the sentence quoted above, we note that in the next sentence we stated that "Congress directed the Agency to regulate utilities 'under this section,' and accordingly EGUs *should* be regulated in the same manner as other categories for which the statute requires regulation." Id. (*emphasis added*). We were not foreclosing the possibility of any alternative interpretation and our use of the term "must" should not detract from the point we were trying to make. Specifically, we believe that Congress would have directed us to regulate EGUs under CAA section 112(n)(1)(A) if that was its intent and, absent that mandate, the better reading of the statute is the one provided in the preamble to the proposed rule, which is that EGUs should be listed pursuant to CAA section 112(c) and subject to CAA section 112(d) emission standards.

The commenter also stated that the EPA relied on CAA section 112(c)(6) to support a conclusion that EGUs must be regulated under CAA section 112(d). The commenter takes the EPA's statements out of context. The statement in whole read:

> Furthermore, the D.C. Circuit Court has already held that section 112(n)(1) "governs how the Administrator decides whether to list EGUs" and that once listed, EGUs are subject to the requirements of CAA section 112. *New Jersey*, 517 F.3d at 583. Indeed, the D.C. Circuit Court expressly noted that "where Congress wished to exempt EGUs from specific requirements of section 112, it said so explicitly," noting that "section 112(c)(6) expressly exempts EGUs from the strict deadlines imposed on other sources of certain pollutants." *Id.* Congress did not exempt EGUs from the other requirements of CAA section 112, and once listed, EPA is required to establish emission standards for EGUs consistent with the requirements set forth in CAA section 112(d), as described below. *See* 76 FR 24993.

As can be seen from this passage, the Court cited section 112(c)(6) as an example of Congress' intent regarding regulating EGUs under CAA section 112. The commenter cited the last clause of the last sentence of the paragraph quoted above without including the prefatory clause "once listed," and, without that clause, the statement is not fairly characterized. The point the EPA was making in that paragraph is that EGUs are a listed source category and listed sources must be regulated under CAA section 112(d) unless the EPA delists the source category.

Comment: One commenter stated that EPA overstates the significance of the D.C. Circuit's holding in *New Jersey* by suggesting that the decision mandates EGU regulation under CAA section 112(d) because EGUs "remain listed" under CAA section 112(c), *See New Jersey*, 517 F.3d at 582. According to the com-

menter, the court declined to address the lawfulness of EPA's having "listed" EGUs under CAA section 112(c), leaving that matter to be decided if and when EPA adopted standards for EGUs under CAA section 112. Nowhere in the decision did the D.C. Circuit indicate that EPA must regulate EGUs under CAA section 112(d).

According to the commenter, the EPA must consider both whether the regulation of EGUs is "appropriate and necessary" under section 112(n)(1) and address anew whether the Agency is authorized by section 112 to list EGUs under section 112(c) at all. The commenter asserts that on the face of the proposal, the EPA has not revisited the question whether the "listing" of EGUs under section 112(c) is consistent with congressional intent.

Response: The commenter's arguments are circular and it is difficult to fully determine exactly what its issue is with EPA's listing; however, it appears that the commenter believes that EPA incorrectly relied on the *New Jersey* decision to justify the listing of EGUs. The commenter also appears to argue that the Agency has never explained why it has the authority to list EGUs at all. We disagree.

As stated in the preamble to the proposed rule, CAA section 112(n)(1)(A) requires EPA to conduct a study of HAP emissions from EGUs and regulate EGUs under CAA section 112 if we determine that regulation is appropriate and necessary, after considering the results of the study. 76 FR 24981, 24986, and 24998. The only condition precedent to regulating EGUs under CAA section 112 is a finding that such regulation is appropriate and necessary (after conducting and considering the Utility Study), and

once that finding is made the Agency has the authority to list EGUs under CAA section 112(c) as the first step in the process of establishing regulations under section 112. The D.C. Circuit agrees with that interpretation of the statute as evidenced by its statement in *New Jersey* that "section 112(n)(1)(A) governs how the Administrator decides whether to list EGUs for regulation under section 112," 517 F.3d at 582, and the Court's statement directly contradicts the commenter's position.

The EPA did not rely on the *New Jersey* decision to justify the appropriate and necessary finding as the commenter suggests. We based the finding in 2000 on the extensive information available to the Agency at the time, and we confirmed the finding in the preamble to the proposed rule based on new information. The commenter had ample opportunity to comment on the appropriate and necessary finding, and it may challenge the basis of the listing (*i.e.* the appropriate and necessary finding) when EPA issues the final standards.

Comment: One commenter believes that the D.C. Circuit will condemn the final rule as a result of EPA's "misapprehension" that upon making an "appropriate and necessary" finding, the Agency is compelled by the CAA to adopt a regulatory standard for EGUs under CAA section 112(d). According to the commenter, a regulation will be invalid if the regulation "'was not based on the [agency's] own judgment'" but "'rather on the unjustified assumption that it was Congress' judgment that such [a regulation] is desirable' or required." *See Transitional Hospitals Corp.* v. *Shalala*, 222 F.3d 1019, 1029 (D.C. Cir. 2000), quoting *Prill* v. *NLRB*, 755 F.2d 941, 948 (D.C. Cir.

1985). The commenter further notes that the D.C. Circuit has held that, where an agency wrongly construes a judicial decision as compelling a particular statutory interpretation, and thereby unduly limits the scope of its own discretion, the agency's action cannot be sustained. *See, e.g., Phillips Petroleum Co.* v. *FERC*, 792 F.2d 1165, 1171 (D.C. Cir. 1986). The commenter believes the rule is bound to be rejected and that the EPA should "reconsider the legal interpretations on which it purports to base its rule."

Response: We do not agree that we have improperly interpreted the statute as limiting our discretion in the manner suggested by the commenter. The commenter makes only one specific allegation in this comment and that concerns the Agency's conclusion that it must establish CAA section 112(d) standards for EGUs in light of the *New Jersey* decision. The commenter does not explain why that conclusion is incorrect. As we state above and in the preamble to the proposed rule, because EGUs are a CAA section 112(c) listed source category, the Agency must establish CAA section 112(d) standards or delist EGUs pursuant to CAA section 112(c)(9). *See New Jersey*, 517 F.3d at 582–83 (holding that EGUs remain listed under section 112(c)); *see also* CAA section 112(c)(2) (requiring the Agency to "establish emission standards under subsection [112] (d)" for listed source categories and subcategories); 76 FR 24998–99. We concluded in the preamble to the proposed rule that we could not delist EGUs because our appropriate and necessary analysis showed that EGUs did not satisfy the CAA section 112(c)(9)(B)(i) delisting criteria. *Id.* We did not address in the preamble to the proposed rule whether EGUs satisfied the CAA section 112(c)(9)(B)(ii) criteria because EGUs failed the first

prong of the delisting provisions. *Id.* We reach the same conclusion in the final rule and also address the delisting petition submitted by this commenter. Because we cannot delist EGUs, we must regulate them under CAA section 112(d). The commenter has provided no legitimate argument to rebut this conclusion. *See also* previous responses regarding regulation under section 112(n)(1)(A).

Comment: One commenter alleges that EPA impermissibly relied on CAA section 112(c)(9) to interpret "hazards to public health", and argues that the "residual risk" provisions in CAA section 112(f)(2) are more appropriate for the establishment of standards for EGUs. The commenter stated that by using CAA section 112(c)(9)(B)(i) in defining "hazards to public health", the Agency has seized on the one interpretation of the phrase that is surely contrary to congressional intent and, thus, falls outside the permissible range of its interpretative discretion. The commenter maintains that the "delisting" criteria of CAA section 112(c)(9) are simply irrelevant to the decision whether EGU HAP emissions will present any "hazards to public health" sufficient to warrant regulation of those emissions under CAA section 112.

The commenter also argues that Congress intended that EGUs be treated differently from all other "major sources" to which the "delisting" provisions of CAA section 112(c)(9), and the standard-setting provisions of CAA section 112(d) necessarily and automatically apply. Therefore, according to the commenter, the EPA's proposal to utilize the criteria of CAA section 112(c)(9) to inform its findings under CAA section 112(n)(1)(A) treats EGUs exactly the same as all other major source categories, is contrary

to congressional intent, and thus unlawful. The commenter goes on to state that in exercising its discretion to define "hazards to public health" as the phrase is used in CAA section 112(n)(1)(A), the EPA would be better served to consider the "residual health risk" provisions of CAA section 112(f)(2). Those provisions provide a better analogy to the establishment of standards for EGUs under CAA section 112 than do the "de-listing" criteria of CAA section 112(c)(9).

The commenter believes the category-specific criteria of paragraph (c)(9) are a poor fit for an evaluation of "hazards to public health" that should reasonably include such factors as the affected population, the characteristics of exposure, the nature of the health effects, and the uncertainties associated with the data. The commenter states that, while CAA section 112(n)(1)(A) does not expressly include any requirement that EGU emissions be regulated with an "ample margin of safety," that standard is more appropriate than the "one-in-a-million" cancer risk standard of CAA section 112(c)(9)(B)(i) that EPA proposes to employ.

Response: The commenter acknowledges that EPA has broad discretion to interpret the phrase "hazard to public health" but argues that the one thing we cannot do is use the CAA section 112(c)(9)(B) delisting provisions as a benchmark in making that interpretation. The commenter asserts that the use of the delisting standard is clearly contrary to Congressional intent but it does not provide any substantive rebuttal to our conclusion that the CAA section 112(c)(9) standards reflects the level of hazard which Congress concluded warranted continued regulation.

Instead, the commenter reverted to its argument that the statute treated EGUs differently. The EPA views the disparate treatment of EGUs in a different light than commenter. While it is true that Congress established a different statutory provision governing whether to add EGUs as a regulated source category under section 112, we do not interpret CAA section 112(n)(1)(A) as providing Congressional license to ignore risks that Congress determined warranted regulation for all other source categories. Because CAA section 112(c)(9) defines that level of risk, it is reasonable to consider it when evaluating whether EGU HAP emissions pose hazards to public health.

The commenter also suggests that the "ample margin of safety standard" of CAA section 112(f)(2) is a better fit than the one-in-a-million standard set forth in CAA section 112(c)(9)(B)(1) for evaluating hazards to public health. The commenter asserts that an evaluation of "hazards to public health" should include such factors as the affected population, the characteristics of exposure, the nature of the health effects, and the uncertainties associated with the data. However, the EPA did not rely solely on the delisting provisions for evaluating hazards to public health as commenter suggests. In fact, the EPA considered all of the factors the commenter suggests in making our finding.[64] Thus, we decline to adjust our approach to evaluating hazards to public health and the environment based on the comments.

h. 2000 Finding (and 2005 Delisting)

Comment: Several commenters generally support EPA's 2000 finding that regulating HAP emissions

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[64] 76 FR 24992.

from EGUs under CAA section 112 is "appropriate and necessary." According to the commenters, the 2000 finding was proper under the CAA and within EPA's discretion, well-supported based on sound science available to the Agency at the time on the harm from HAP emitted by EGUs, and no additional information makes the finding invalid. Several commenters cited the conclusions of the Utility Study[65] and Mercury Study,[66] which they assert supported the finding and satisfied the only prerequisite for the finding. One commenter specifically asserted that the 2000 finding was well-supported by the Utility Study's conclusions that (1) there was a link between anthropogenic Hg emissions and MeHg found in freshwater fish, (2) Hg emissions from coal-fired utilities were expected to worsen by 2010, and (3) MeHg in fish presents a threat to public health from fish consumption. One commenter noted that the CAA does not require a conclusive link between HAP emissions and harm. One commenter stated that the CAA grants the Administrator discretion in her finding, and that discretionary decision should not be overly scrutinized, citing court opinion.[67] In support of the finding, one commenter stated that it would not make sense for Congress to limit HAP emissions

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[65] U.S. EPA 1998. Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units—Final Report to Congress. EPA–453/R–98–004a. February.

[66] U.S. EPA, 1997.

[67] "Where a statute is precautionary in nature, the evidence difficult to come by, uncertain, or conflicting because it is on the frontiers of scientific knowledge, the regulations designed to protect the public health, and the decision that of an expert administrator, [courts] will not demand rigorous step-by-step proof of cause and effect." *Ethyl Corp.* v. *EPA*, 541 F.2d 1, 28 (Ct. App. D.C. Circ. 1978).

from small businesses such as dry cleaners but to exempt U.S. EGUs, which are the largest sources of many HAP emissions. One commenter agreed that finding was further supported because numerous control options were available to reduce HAP emissions. One commenter agreed with the 2000 finding that the Agency lacked sufficient evidence to conclude that non-Hg HAP from EGUs posed no hazard.

The commenters who generally supported the 2000 finding also commented on specific aspects of the finding. Several commenters asserted that while the evidence on Hg alone supports the finding, the potential harm from non-Hg HAP further supported the 2000 finding. Several commenters noted that new science continues to support the 2000 finding. Several commenters also stated that the "appropriate" finding was further supported because numerous control options were available at the time of the finding that would reduce HAP emissions. One commenter concurred with EPA that regulating natural gas-fired EGUs was not appropriate and necessary because the impacts due to HAP emissions from such units are negligible based on the results of the Utility Study.

Several commenters addressed the 2005 reversal of the 2000 finding. Several commenters specifically supported the vacatur of the 2005 action. Other commenters asserted that the 2005 action was proper, and that EPA reverted back to the 2000 finding in the proposed rule without adequate explanation or support. Several commenters cited the 2005 action as invalidating the 2000 finding, specifically noting that EPA concluded that "no hazards to public health" remained after accounting for emission re-

ductions under CAIR. These commenters assert that EPA's current position is illegal because EPA took the exact opposite position on the interpretation of the term "necessary" in its 2005 reversal, and, thus, deserves no judicial deference. One commenter stated that in 2005 EPA recognized the potential for excessive regulation created by CAA section 112 and determined that the 2000 finding lacked foundation.

Several commenters generally disagreed with the 2000 finding, with two commenters stating that EPA did not have a rational justification for it and another claiming that it was fraught with misinformation and overestimating assumptions. One commenter claimed that EPA did not explain the terms "appropriate" and "necessary" in the 2000 finding and that the emission control analysis was inadequate. Two commenters stated that the 2000 finding was based on data that was more than 10 years old, which causes serious concern regarding the validity of the findings because technology, the regulatory environment, and the economic climate have evolved. Furthermore, because the Utility Report underestimated emissions controls that EGUs would install by 2010 and additional controls that would be later required by the CSAPR, the basis for EPA's 2000 finding has changed. Several commenters stated that a "plausible link" between anthropogenic Hg and MeHg in fish is not an adequate reason for the 2000 finding. Several commenters claim that EPA only identified health concerns for Hg (and potentially Ni) but not other HAP from coal-fired EGUs in the 2000 finding, and, thus, cannot regulate HAP other than Hg because the 2000 finding authorizes only the regulation of Hg. One commenter questioned the Hg emissions underlying the 2000 finding, specifically the fraction

of total deposition attributable to U.S. EGUS and the fact that EPA projected an increase in U.S. EGU emissions from 1990 to 2010 though emissions actually declined.

Several commenters raised procedural issues related to the 2000 finding. Several commenters stated that the 2000 finding failed to provide public notice and comment. According to the commenters, the CAA requires that any decision made under CAA section 112(n) must go through public notice and comment. The commenters further stated that the failure to provide public notice and comment means that this MACT is outside EPA's statutory authority. One commenter stated that because the 2000 finding was never "fully ventilated" in front of the D.C. Circuit, the EPA's authority to regulate EGUs under CAA section 112(d) is directly at issue. The commenters claim that specific issues did not undergo public notice and comment, including least-cost regulatory options, the impact of regulation on electricity reliability, and EPA's interpretation of the requirements under CAA section 112(n)(1)(A). One commenter claims that EPA attempted to provide after-the-fact support for its 2000 finding with new legal analysis and new factual information, contrary to *New Jersey* v. *EPA* that held that EPA may not revisit its 2000 finding except through delisting under CAA section 112(c)(9). One commenter stated that EPA's 2000 finding should be reviewed when EPA issues the actual NESHAP.[68] One commenter stated that the 2000 finding ignored EO 12866.

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[68] *See UARG* v. *EPA*, 2001 WL 936363, No. 01–1074 (D.C. Cir. July 26, 2001).

Response: EPA agrees with the commenters that the 2000 finding was reasonable and disagrees with the commenters asserting that the 2000 finding was unreasonable or failed to follow proper procedural requirements.

The EPA agrees that reviewing courts defer to the reasoned scientific and technical decisions of an Agency charged with implementing complex statutory provisions such as those at issue in this case. As EPA stated in the preamble to the proposed rule, the EPA maintains that the 2000 finding was reasonable and based on well-supported evidence available at the time, including the Utility Study, the Mercury Study,[69] and the NAS study,[70] which all showed the hazards to public health and the environment from HAP emitted from EGUs. New technical analyses conducted by EPA confirm that it remains appropriate and necessary to regulate HAP emissions from EGUs. Furthermore, the EPA agrees with the commenters on several points raised, specifically that EGUs were and remain the largest anthropogenic source of several HAP in the U.S., that risk assessments supporting the 2000 finding indicated potential concern for several non-Hg HAP, and that several available control options would effectively reduce HAP emissions from U.S. EGUs.

The EPA agrees with the commenters that Congress did not exempt EGUs from section 112(d) HAP emission limits while simultaneously limiting emissions at other sources with less HAP emissions. Congress simply provided EPA with a separate path for

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[69] U.S. EPA, 1997.

[70] NAS, 2000.

listing EGUs by requiring that the Agency evaluate HAP emissions from EGUs and determine whether regulation under CAA section 112 was appropriate and necessary. Since 1990, the EPA has promulgated regulations requiring the use of available control technology and other practices to reduce HAP emissions for more than 170 source categories. U.S. EGUs are the most significant source of HAP in the country that remains unaddressed by Congress's air toxics program. The EPA listed EGUs in 2000 because the considerable amount of available data supported the conclusion that regulation of EGUs under CAA section 112 was appropriate and necessary. That finding was valid at the time, and EPA reasonably added EGUs to the CAA section 112(c) list of sources that must be regulated under CAA section 112.

The EPA acknowledges that we did not expressly define the terms appropriate and necessary in the 2000 finding, but the finding is instructive in that it shows that EPA considered whether HAP emissions from EGUs posed a hazard to public health and the environment and whether there were control strategies available to reduce HAP emissions from EGUs when determining whether it was appropriate to regulated EGUs.[71] When concluding it was necessary, the Agency stated that imposition of the requirements of the Act would not address the identified hazards to public health or environment from HAP emissions and that section 112 was the proper authority to address HAP emissions.[72] The EPA explained in the preamble to the proposed rule its con-

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[71] 65 FR 79830.

[72] *Id.*

clusion that the 2000 finding was fully supported by the information available at the time,[73] and EPA stands by the conclusions in that notice. Furthermore, the EPA provided an interpretation of the terms appropriate and necessary that is wholly consistent with the 2000 finding. The EPA does not agree with the commenters that a quantification of emissions reductions or a specific identification of the available controls was necessary to support the 2000 finding and listing. The EPA considered the Utility Study when making the finding, and that study clearly articulated the various alternative control strategies that EGUs could employ to control HAP emissions.[74] As to emission reductions, the EPA cannot estimate the level of HAP emission reductions until the Agency proposes a CAA section 112(d) standard after a source category is listed.

The EPA disagrees with commenters that suggest it was not "rational" to determine that it was appropriate to regulate HAP emissions from EGUs due to the cancer risks identified in the Utility Study or the potential concerns associated with other HAP emissions from EGUs. Nothing in CAA section 112(n)(1)(A) suggests that EPA must determine that every HAP emitted by EGUs poses a hazard to public health or the environment before EPA can find it appropriate to regulate EGUs under CAA section 112. In fact, the EPA maintains that it must find it appropriate and necessary to regulate EGUs under CAA section 112 if it determines that any one HAP emitted from EGUs poses a hazard to public health or the environment that will not be addressed through im-

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[73] 65 FR 24994–24996.

[74] *See* Chapter 13 of the Utility Study (U.S. EPA, 1998).

position of the requirements of the Act. The EPA disputes the commenters' conclusion that the 2000 finding was limited to Hg and Ni emissions, but, even if it were, the EPA reasonably concluded that EGUs should be listed pursuant to CAA section 112(c) based on the Hg and Ni finding. As stated in the 2000 finding, cancer risks from some non-Hg metal HAP (including As, Cr, Ni, and Cd) were not low enough to be to eliminate as potential concern.[75] Source categories listed for regulation under CAA section 112(c) must be regulated under CAA section 112(d), and the D.C. Circuit has stated that EPA has a "clear statutory obligation to set emission standards for each listed HAP". *See Sierra Club* v. *EPA*, 479 F.3d 875, 883 (D.C. Cir. 2007), *quoting National Lime Association* v. *EPA*, 233 F.3d 625, 634 (D.C. Cir. 2000). Therefore, even if EPA concluded that CAA section 112(n)(1) authorized a different approach for regulating HAP emissions from EGUs, the chosen course which is supported by the CAA (*i.e.*, listing under CAA section 112(c)) requires the Agency to regulate under CAA section 112(d) consistent with the statute and case law interpreting that provision.

The EPA disagrees that there is any concern regarding the validity of the 2000 finding or that the emissions information provided in the 2000 finding makes the finding "questionable" as stated by some of the commenters. The EPA maintains that the 2000 finding was sound and fully supported by the record available at the time, including the future year emissions projections. Therefore, the listing of EGUs is valid based on that finding alone. Even though Hg emissions have decreased since the 2000 finding in-

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[75] 76 FR 79827.

stead of increasing as projected, the new technical analyses confirm that Hg emissions from EGUs continue to pose hazards to public health and the environment. The EPA also indicated potential concern for several non-Hg HAP in the 2000 finding. It is well established that even small amounts of HAP can cause significant harm to human health and the environment.

The EPA agrees with the commenters who assert that the 2005 action was in error and disagrees with the commenters that the 2005 action invalidated the 2000 finding. As fully described in the preamble to the proposal, the EPA erred in the 2005 action by concluding that the 2000 finding lacked foundation. The 2005 action improperly conflated the "appropriate" and "necessary" analyses by addressing the "after imposition of the requirements of the Act" in the appropriate finding as well as the necessary finding. The EPA also indicated that it was not reasonable to interpret the necessary prong of the finding as a requirement to scour the CAA for alternative authorities to regulate HAP emissions from stationary sources, including EGUs, when Congress provided section 112 for that purpose. The EPA asserts that the 2000 finding was sound and fully supported by the record available at the time for all the reasons stated in this final rule and the proposed rule. The 2005 action interpreted the statute in a manner inconsistent with the 2000 finding and attempted to delist EGUs without complying with the mandates of CAA section 112(c)(9)(B). *See New Jersey*, 517 F.3d at 583 (vacating the 2005 "delisting" action). In the preamble to the proposed rule, the EPA set forth a revised interpretation of CAA section 112(n)(1) that is consistent with the statute and the 2000 finding.

The EPA also explained in the preamble to the proposed rule why the 2005 action was not technically or scientifically sound. The EPA specifically addressed the errors associated with the 2005 action in the preamble to the proposed rule, and commenters' assertions do not cause us to revisit these issues. The commenter is also incorrect in suggesting that a change in interpretation is per se invalid and provided no support for that position. *See National Cable & Telecommunications Ass'n, et al.*, v. *Brand X Internet Services, et al.*, 545 U.S. 967, 981 (discussing the deference provided to an Agency changing interpretations, the Court stated "change is not invalidating, since the whole point of *Chevron* deference is to leave the discretion provided by ambiguities of a statute with the implementing Agency.") (Internal citations and quotations omitted).

The EPA disagrees with the commenters who raise concerns about the validity of the 2000 finding because the data on which that finding was based were more than 10 years old. The EPA made the finding at that time based on the scientific and technical information available, and the finding is wholly supported by that information. In addition, even though not required to do so, the EPA has since conducted new technical analyses utilizing the best information available in 2010 as several years have passed since the 2000 finding. These new analyses confirm that HAP emissions from EGUs continue to pose a hazard to public health and the environment, even after taking into account emission reductions that have occurred since 2000 from promulgated rules, settlements, and consent decrees. *See* 76 FR 24991.

Contrary to the commenter's assertion, the EPA did not violate CAA section 307(d) by not providing a notice and comment opportunity before making the December 2000 appropriate and necessary finding. One commenter challenged EPA's 2000 finding and listing on the same grounds, and the D.C. Circuit dismissed the case because CAA section 112(e)(4) clearly states that listing decisions cannot be challenged until the Agency issues final emission standards for the listed source category. *See UARG* v. *EPA*, 2001 WL 936363, No. 01–1074 (D.C. Cir. July 26, 2001). The EPA has provided the public an opportunity to comment on both the 2000 finding and the 2011 analyses that support the appropriate and necessary determination as part of the proposed rule, and anyone may challenge the listing in the D.C. Circuit in conjunction with a challenge to this final rule. The commenters could have also commented on the CAA section 112(n)(1) (*e.g.*, the Utility Study and the Mercury Study) studies in 2000 as they were included in the docket, but EPA is not aware of any comments on those studies. In any case, these studies were peer reviewed and considered the best information available at that time. The EPA has fully complied with the rulemaking requirements of CAA section 307(d).

The EPA also disagrees with the commenters' characterization of the *New Jersey* case. The D.C. Circuit did not say, as one commenter suggested, that EPA is not able to consider additional information that is collected after the 2000 finding; instead, the Court stated that EPA could not revise its appropriate and necessary finding and remove EGUs from the CAA section 112(c) list without complying with the delisting provisions of CAA section 112(c)(9). *See New Jersey*, 517 F.3d at 582–83. The EPA also disa-

grees with the commenter's assertion that EPA disregarded EO 12866 when making the 2000 finding. As stated in the Federal Register notice, the 2000 finding did not impose regulatory requirements or costs and was reviewed by the Office of Management and Budget (OMB) in accordance with the EO.[76]

2. New Technical Analyses

a. General Comments on New Technical Analyses

Comment: Several commenters stated that the new analyses, including the risk assessments and technology assessments, confirm that it remains appropriate and necessary to regulate U.S. EGU HAP under CAA section 112. These commenters stated that the new analyses provide even more support than the risk and technology information available at the time the 2000 finding was made, including information on further developed emissions control technology, proven and cost-effective control of acid gases using trona and dry sorbent injection, stabilized natural gas prices that makes fuel switching and switching dispatch to underutilized combined cycle plants more feasible, more information on ecosystem impacts from HAP, "hotspots" from the deposition of Hg around EGUs, the potential for re-emission of Hg, updated emissions data and future projections of HAP emissions, and modern air pollution modeling tools. One commenter states affordable control technology has been in use in this sector for 10 to 40 years, and studies on EGU-attributable Hg hazard has undergone two in-depth EPA reviews, as well as a review by the NAS. Several commenters claimed that regulating U.S. EGUs is appropriate and necessary to protect public

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[76] 65 FR 79831.

health based on information provided in the new technical analyses. These commenters acknowledged the substantial reductions in HAP from recent regulations and new studies that confirm serious health risks from HAP exposure. One commenter stated that new studies show higher risks to fetuses than previously estimated, increasing the potential for neurodevelopmental effects in newborns. One commenter noted that EGUs are a major source of HAP, including HCl, HF, As, antimony, Cr, Ni, and selenium, all of which adversely affect human health. The commenter stated that because of these health effects, the EPA has ample evidence to support a determination that non-Hg HAP emissions present a risk to human health.

Other commenters disagreed that the new analyses confirm that it remains appropriate and necessary to regulate U.S. EGUs. One commenter claims that EPA tried to use the new technical analyses to provide retroactive justification for the 2000 finding, which only found "plausible links" of health effects and "potential concerns" of health effects of certain metal emissions, dioxins and acid based aerosols. The commenter also asserted that none of these new analyses demonstrate that EGU regulation under section 112 is necessary and appropriate.

One commenter agreed that EPA may supplement its finding with new information, analyses and arguments to reaffirm the 2000 finding up until EPA issues final emissions standards. The commenter noted that the CAA does not freeze the finding. However, another commenter argued that EPA does not have the authority to rely on new technical analyses because the CAA requires EPA to make the find-

ing on the basis of the Utility Study alone. According to that commenter, the EPA unreasonably stretched the language of CAA section 112 by considering new technical analyses.

Citing a report from Dr. Willie Soon that was submitted to the SAB, one commenter stated that the new technical analyses supporting the proposed rule do not conform to the Information Quality Act, which requires that information relied on by EPA be accurate, reliable, unbiased, and presented in a complete and unbiased manner.

Response: The EPA agrees with the commenters that state that the new technical analyses (*e.g.*, the risk assessments and technology assessment) confirm the 2000 finding and disagrees with the commenters that state otherwise. The EPA also agrees with the commenters that the 2000 finding was valid at the time it was made based on the CAA section 112(n)(1) studies and other information available to the Agency at that time. Furthermore, the EPA agrees with commenters that the final rule will lead to substantial reductions in HAP emissions from EGUs, that control of the HAP is estimated to lead to public health and environmental benefits as discussed in the RIA, that Hg emissions from U.S. EGUs pose a hazard to public health, and that non-Hg HAP emissions from EGUs pose a hazard to public health.

Although these new analyses were not required, the EPA agrees with the commenters that stated that EPA is authorized to conduct additional analyses to confirm the 2000 finding. The EPA disagrees with the commenter's assertion that the Agency is not authorized to consider new information and at the same time unable to use the information available in 2000

because, according to the commenter, that information is "stale." Under this theory, the Agency could not ever make an appropriate and necessary finding prospectively, thereby excusing the Agency from its obligations to protect public health and the environment because it did not diligently act in undertaking its statutory responsibility to establish CAA section 112(d) standards within two years of listing EGUs. *See* CAA section 112(c)(5). This is an illogical result that finds no basis in the statute. The EPA also disagrees with the commenter's assertion that EPA may not consider new analyses conducted after the Utility Study in determining whether it is appropriate and necessary to regulate EGUs under section 112 for the reasons set forth in the preamble to the proposed rule.[77]

The EPA disagrees with the commenter's implication that EPA conducted the new analyses because of alleged flaws in the 2000 finding. As explained in detail in the preamble to the proposed rule, the 2000 finding was wholly valid and reasonable based on the information available to the Agency at that time, including the Utility Study. Further, the EPA maintains that had it complied with the statutory mandate to issue CAA section 112(d) standards within two years of listing EGUs, the EPA would likely have declined to conduct new analyses. The EPA conducted new analyses because over 10 years had passed since the 2000 finding, and EPA wanted to evaluate HAP emissions from U.S. EGUs based on the most accurate information available, though the Agency was not required to reevaluate the 2000 finding. In

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[77] 76 FR 24988.

conducting the new analyses, the EPA used this updated information to further support the finding.

The EPA strongly disagrees with the commenter that stated that EPA failed to conform to the Information Quality Act. The EPA used peer reviewed information and quality-assured data in all aspects of the technical analyses used to support the appropriate and necessary finding supporting this regulation. In addition, the EPA submitted the Hg Risk TSD to the SAB for peer review, which "supports the overall design of and approach to the risk assessment and finds that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs."[78] The SAB received the comments from Dr. Willie Soon, and had those comments available for consideration in their deliberations regarding the Hg risk analysis. The SAB specifically supported elements of the analysis criticized by Dr. Willie Soon regarding the use of the EPA RfD as a benchmark for risk and the connection between Hg emissions from U.S. EGUs and MeHg concentrations in fish. In addition, the risk assessment methodology for the non-Hg case studies is consistent with the methodology that EPA uses for assessments performed for Risk and Technology Review rulemakings, which underwent peer review by the SAB in 2009.[79] During the public comment period, the EPA also completed a letter peer review of the methods used to develop inhalation cancer risk estimates for Cr and Ni compounds, and those reviews were generally supportive. See above description of this peer review. For the fi-

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[78] U.S. EPA–SAB, 2011.

[79] U.S. EPA–SAB, 2010.

nal rulemaking, the EPA revised both risk assessments consistent with recommendations from the peer reviewers. The EPA relies on the SAB's review of the quality of the information supporting the analytical results. Accordingly, contrary to the commenters' assertions, the EPA acted consistently with the Information Quality Act as well as EPA's and OMB's peer review requirements.

b. Hg Emissions Estimates

1. Hg Emissions From EGUs

Comment: The commenters addressed the 2005 and 2016 emissions estimates for Hg and expressed concern that inaccuracies in these emissions estimates result in overestimates of risks from Hg deposition. Further, commenters compared EPA's 2010 estimate and 2016 estimate, and stated that it is not possible for 29 tons to be a correct inventory total for Hg emissions in both years given expected reductions from CSAPR. In addition, commenters specifically commented on assumptions included in the Integrated Planning Modeling (IPM), including a concern that Hg speciation factors used by IPM overestimate emissions in 2016. Other commenters noted that EGU sources are the predominant source of U.S. anthropogenic Hg emissions, particularly the oxidized and particulate forms of Hg that are of primary concern for Hg deposition.

Response: The EPA disagrees with commenters' assertions that the EPA's emissions estimates overestimate risk. While EPA agrees that the 2005 Hg emissions may be overestimated, such an overestimate in 2005 would actually lead to an underestimate of risk in 2016 and not an overestimate of risk,

as claimed by the commenter, because the ratio approach used by EPA to scale fish tissue data would underestimate risk if 2005 Hg estimates were overestimated. Since the 2005 emissions are not used as a starting point for 2016 emissions from IPM, any 2005 overestimate does not affect the 2016 emissions levels. The 2016 emissions are computed by IPM based on forecasts of demand, fuel type, Hg content of the fuel, and the emissions reductions resulting from each unit's configurations. *See* IPM Documentation for further information, which is available in the docket. No commenter has provided any evidence that the IPM 2016 emissions projection methodology resulted in an overestimate.

The EPA acknowledges that the current Hg emissions estimate would not be the same as the 2016 Hg emissions estimate given that compliance with CSAPR is anticipated to have some Hg co-benefits. For this reason, the EPA reflected emission reductions anticipated from CSAPR in the Hg deposition modeling for 2016 in the Hg Risk TSD. In the final rule, the EPA revised the estimate of Hg emissions remaining from U.S. EGUs in 2016, which includes additional emission reductions anticipated from the final CSAPR. The revised estimate shows that U.S. EGUs would emit 27 tons of Hg in 2016. Although EPA does not use the current Hg emissions estimates in any of the risk calculations, the EPA estimates that current Hg emissions are 29 tons. Conclusions about the trend between current emissions and emissions in 2016 are limited by the fact that different methods were used to compute the two estimates, as fully explained in the revised Emissions Overview memo in the docket.

The EPA disagrees with the commenter's assertion that incorrect Hg emission factors result in incorrect 2016 emissions. The 2016 projected Hg emissions are not based on emissions factors. The 2016 Hg emissions are computed by the IPM based on forecasts of demand, fuel type, Hg content of the fuel, and the emissions reductions resulting from each unit's configurations. The speciation factors referenced by the commenter provide a basis for the speciation of total projected Hg emissions into particulate, divalent gaseous, and elemental species, and do not impact the total amount of Hg emissions.

The EPA agrees with commenters who noted that EGU sources are the predominant source of U.S. anthropogenic Hg emissions, and in particular the oxidized and particulate forms of Hg that are of primary concern for Hg deposition.

2. Global Hg Emissions

Comment: Several commenters stated that predicted Hg deposition relies heavily on the amount of gaseous elemental Hg used to define the boundary and initial conditions of a model, e.g., the Hg that enters the U.S. from outside the U.S. boundaries. The commenters asserted that this is especially important because Hg emissions from Asia—the region immediately upwind of North America that affects U.S. Hg deposition significantly and also affects it the most compared to other regions—are expected to continue to increase.[80] [81] [82] [83] [84] [85] According to the comment-

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[80] Jaffe D., Prestbo E., Swartzendruber P., Weiss-Penzias P., Kato S., Takami A., Hatakeyama S., Kajii Y., 2005. "Export of Atmospheric Mercury From Asia," *Atmospheric Environment*, 39, 3029–3038.

er, this would affect the amount of Hg in the boundary and initial conditions. The commenters claim that EPA's modeling did not account for these emission changes, thus leading to an overestimate of U.S. EGU-attributable deposition in 2016.

Several commenters noted that Hg emissions from U.S. EGUs are small when compared to global Hg emissions totals and natural sources within the U.S. These commenters used a variety of information to support alternative conclusions about the necessity to control U.S. EGU emissions to reduce Hg risk: global Hg emissions inventories, global and regional photochemical modeling research, and observation-based assessments. A commenter stated that EPA has not acknowledged the dramatic decline in Hg emissions from U.S. EGUs since the late 1990s (approximately 50 percent) to the current level or consider the rela-

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[81] Jaffe D., Strode S., 2008. "Fate and Transport of Atmospheric Mercury From Asia," *Environmental Chemistry*, 5, 121.

[82] Pacyna E.G., Pacyna J.M., Sundseth K., Munthe J., Kindbom K., Wilson S., Steenhuisen F., Maxson P., 2010. "Global Emission of Mercury to the Atmosphere From Anthropogenic Sources in 2005 and Projections to 2020," *Atmospheric Environment*, 44, 2487–2499.

[83] Pirrone N., Cinnirella S., Feng X., Finkelman R.B., Friedli H.R., Leaner J., Mason R., Mukherjee A.B., Stracher G.B., Streets D. G., Telmer K., 2010. "Global Mercury Emissions to the Atmosphere From Anthropogenic and Natural Sources," *Atmospheric Chemistry and Physics*, 10, 5951– 5964.

[84] Streets, D.G., Zhang, Q., Wu, Y., 2009. "Projections of Global Mercury Emissions in 2050." *Environmental Science & Technology* 43, 2983– 2988.

[85] Weiss-Penzias P., Jaffe D., Swartzendruber P., Dennison J.B., Chand D., Hafner W., Prestbo E., 2006. "Observations of Asian Air Pollution in the Free Troposphere at Mt. Bachelor Observatory in the Spring of 2004," *Journal of Geophysical Research*, 110, D10304.

tive magnitude of Hg emissions from U.S. EGUs compared to other sources, natural (such as fires) and human-caused.

Response: The EPA disagrees that boundary and initial conditions used in modeling Hg deposition need adjustment for several reasons. First, the EPA does not use the first 10 days of the modeling simulation in the analysis, which is more than sufficient to remove the influence of initial conditions on Hg deposition estimates.[86] Second, it is difficult to accurately characterize the speciation of Hg that flows into the U.S. from other countries due to the lack of data near the boundaries of the modeling domain. Third, the boundary inflow for the CMAQ Hg modeling used in the Hg deposition modeling are based on a global model GEOS–CHEM simulation using a 2000 based global inventory.[87] A recently published comparison of global Hg emissions by continent for 2000 and 2006 found that total Hg emissions from Asia (and Oceania) total 1,306 Mg/yr in 2000 and 1,317 Mg/yr in 2006.[88] The EPA has determined that because the Asian Hg emissions estimated in this study are nearly constant between 2005 and 2006, any adjustments to the boundary conditions or adjustments to modeled

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[86] Pongprueksa, P., Lin, C.J., Lindberg, SE., Jang, C., Braverman, T., Bullock, O.R., Ho, T.C., Chu, H.W., 2008. "Scientific Uncertainties in Atmospheric Mercury Models III: Boundary and Initial Conditions, Model Grid Resolution, and Hg (II) Reduction Mechanism." *Atmospheric Environment* 42, 1828–1845.

[87] Selin, NE., Jacob, D.J., Park, R.J., Yantosca, R.M., Strode, S., Jaegle, L., Jaffe, D. 2007. "Chemical Cycling and Deposition of Atmospheric Mercury: Global Constraints From Observations." *Journal of Geophysical Research-Atmospheres* 112.

[88] Streets *et al.*, 2009.

Hg deposition would be invalid and inappropriate. Recent research has shown that ambient Hg concentrations have been decreasing in the northern hemisphere since 2000.[89] Because emissions from Asia have not appreciably changed between 2000 and 2006 and ambient Hg concentrations have been decreasing, ENVIRON's analysis contains incorrect assumptions and we need not address them further. For these reasons and the large uncertainties surrounding projected Hg global inventories, the EPA concludes that the most appropriate technical choice is to keep the Hg boundary conditions the same between the 2005 and 2016 simulations.

The EPA also disagrees with the commenters' assertion that EPA has not acknowledged the decline in Hg emissions for the U.S. EGUs since the late 1990s. The EPA analyzed historical, current, and future projected Hg emissions from the power generation sector, as cited in the preamble to the proposed rule. The EPA also disagrees with the commenters' assertions that EPA failed to consider the relative magnitude of Hg emissions from U.S. EGUs compared to other sources. As noted in the Hg Risk TSD, the EPA modeled Hg emissions from U.S. and non-U.S. anthropogenic and natural sources to estimate Hg deposition across the country. The EPA also determined the contribution of Hg emissions from U.S. EGUs to total Hg deposition in the U.S. by running modeling simulations for 2005 and 2016 with Hg emissions from U.S. EGUs set to zero. Based on the Hg Risk TSD, Hg emissions from U.S. EGUs pose a hazard to

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[89] Slemr, F., Brunke, E.G., Ebinghaus, R., Kuss, J., 2011. "Worldwide Trend of Atmospheric Mercury Since 1995." *Atmospheric Chemistry and Physics* 11, 4779–4787.

public health based on the total of 29 percent of modeled watersheds potentially at-risk. Our analyses show that of the 29 percent of watersheds with population at-risk, in 10 percent of those watersheds U.S. EGU deposition alone leads to potential exposures that exceed the MeHg RfD, and in 24 percent of those watersheds, total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition.

The commenters suggest that Hg emissions from U.S. EGUs represent a limited portion of the total Hg emitted worldwide, including anthropogenic and natural sources. While EPA acknowledges that Hg emissions from U.S. EGUs are a small fraction of the total Hg emitted globally, it views the environmental significance of Hg emissions from U.S. EGUs and other domestic sources as a more germane consideration. Mercury is emitted from EGUs in three forms. Each form of Hg has specific physical and chemical properties that determine how far it travels in the atmosphere before depositing to the landscape. Although gaseous oxidized Hg and particle-bound Hg are generally local/regional Hg deposition concerns, all forms of Hg may deposit to local or regional watersheds. U.S. coal-fired power plants account for over half of the U.S. controllable emissions of the quickly depositing forms of Hg. Although emissions from international Hg sources contribute to Hg deposition in the U.S., the peer reviewed scientific literature shows that Hg emissions from U.S. EGUs in the U.S. significantly enhance Hg deposition and the response of ecosystems in the U.S.[90] [91] [92] [93]

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[90] Caffrey *et al.*, 2010.

c. Hg Deposition Modeling

1. General Comments on Deposition Modeling

Comment: Several commenters stated that according to the ENVIRON report, the EPA overestimated U.S. EGU-attributable Hg deposition by 10 percent on average (and up to 41 percent in some areas). The commenters claim this overestimation is the result of boundary condition treatment, the exclusion of U.S. fire emissions,[94] and Hg plume chemistry approach. In addition, one commenter referenced the same ENVIRON report and stated that before implementation of controls required by the proposed rule, areas with relatively high EGU-attributable Hg deposition (one-fifth or more of total deposition) in 2016 constitute less than 0.25 percent of the continental U.S. area, and only three grid cells have EGU contributions exceeding half of total deposition.

Another commenter suggested that current research shows that models of Hg atmospheric fate and

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[91] Driscoll, C. T., Han, Y.-J., Chen, C. Y., Evers, D. C., Lambert, K. F., Holsen, T. M., *et al.*, (2007). "Mercury Contamination in Forest and Freshwater Ecosystems in the Northeastern United States." *BioScience*, 57(1).

[92] Keeler, G.J., Landis, M.S., Norris, G.A., Christianson, E.M., Dvonch, J.T., 2006. "Sources of Mercury Wet Deposition in Eastern Ohio, USA." *Environmental Science & Technology* 40, 5874–5881.

[93] White, E.M., Keeler, G.J., Landis, M.S., 2009. "Spatial Variability of Mercury Wet Deposition in Eastern Ohio: Summertime Meteorological Case Study Analysis of Local Source Influences." *Environmental Science & Technology* 43, 4946–4953.

[94] Finley, B.D., Swartzendruber, P.C., Jaffe, D.A., 2009. "Particulate Mercury Emissions in Regional Wildfire Plumes Observed at the Mount Bachelor Observatory." *Atmospheric Environment* 43, 6074–6083.

transport overestimate the local and regional impacts of some anthropogenic sources, such as U.S. EGUs. Thus, according to the commenter, calculated contributions to Hg deposition and fish tissue MeHg levels from these sources represent upper bounds of actual contributions,[95] [96] and EPA should present results as estimates of lower and upper bound limits.

Response: The EPA disagrees with the information presented by ENVIRON. The ENVIRON report is based on the misapplication of multiple incommensurate modeling studies and false premises which include the incorrect notion that the boundary conditions are over-estimated and the idea that EPA should use in-plume chemistry that has not been explicitly characterized and peer reviewed. Reactions that may reduce gas phase oxidized Hg in plumes have not been explicitly identified in literature. Recent studies in central Wisconsin and central California suggest the opposite may happen; elemental Hg may be oxidized to Hg(II) in plumes.[97] [98] Better field

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[95] Seigneur, C., Lohman, K., Vijayaraghavan, K., Shia, R.L., 2003. "Contributions of global and regional sources to mercury deposition in New York State." Environmental Pollution 123, 365–373.

[96] Seigneur, C., Vijayaraghavan, K., Lohman, K., Karamchandani, P., Scott, C., 2004. "Modeling the atmospheric fate and transport of mercury over North America: power plant emission scenarios." *Fuel Processing Technology* 85, 441–450.

[97] Kolker, A., Olson, M.L., Krabbenhoft, D.P., Tate, M.T., Engle, M.A., 2010. "Patterns of mercury dispersion from local and regional emission sources, rural Central Wisconsin, USA." *Atmospheric Chemistry and Physics* 10, 4467–4476.

[98] Rothenberg, SE., McKee, L., Gilbreath, A., Yee, D., Connor, M., Fu, X.W., 2010. "Wet deposition of mercury within the vicinity of a cement plant before and during cement plant maintenance." *Atmospheric Environment* 44, 1255–1262.

study measurements and specific reaction mechanisms need to be identified before making conclusions about potential Hg in-plume chemistry or applying surrogate reactions in regulatory modeling. The possibility that Hg(0) is oxidized to Hg(II) in plumes suggests coal-fired power plant Hg contribution inside the U.S. may be underestimated in EPA modeling.

The EPA asserts that the numbers suggested by the commenter are inaccurate, as it is not appropriate to adjust EPA's deposition estimates based on previous Hg modeling done with older Hg chemistry, in-plume reactions that have not been explicitly identified, and erroneous adjustments to Hg boundary inflow. Recent research has shown that ambient Hg concentrations have been decreasing in the northern hemisphere since 2000.[99] The EPA declines to revise this analysis as commenter suggests for several reasons, including available evidence indicates that emissions from China have not appreciably changed between 2000 and 2006 [100] and ambient Hg concentrations have decreased, the commenter inappropriately comingled out–of-date Hg modeling simulations with EPA results, and ENVIRON's analysis has not undergone any scientific peer review and presents information with incorrect assumptions as noted in this response.

The EPA also disagrees with the commenter's interpretation of the applicability of wildfire Hg emissions to this assessment. Finley *et al.*, (2009)[101] suggests caution when using their field data to make as-

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[99] Slemr *et al.*, 2011.

[100] Streets *et al.*, 2009.

[101] Finley *et al.*, 2009.

sumptions about Hg(p) emissions from wildfires; the estimated particulate Hg emissions from wildfires is based on one field site with a limited sample size, and the assumptions made (such as the observed Hg(p) to carbon monoxide ratios at this location) may not be valid on a broader scale.[102] Mercury emissions from wildfires are a re-volatilization of previously deposited Hg.[103] Given that electrical generating power plants are currently and historically have been among the largest Hg-emitting sources, the inclusion of wildfire emissions in a modeling assessment would necessarily increase the contribution from this emissions sector.

The EPA disagrees with the assertion that EPA failed to consider the relative magnitude of Hg emissions from U.S. EGUs compared to other sources and disagrees with the interpretation of EGU deposition presented in the ENVIRON report. As noted in the Hg Risk TSD, the EPA modeled Hg emissions from U.S. and non-U.S. anthropogenic and natural sources to estimate Hg deposition across the country. The EPA also determined the contribution of Hg emissions from U.S. EGUs to total Hg deposition in the U.S. by running modeling simulations for 2005 and 2016 with Hg emissions from U.S. EGUs set to zero. Hg emissions from U.S. EGUs pose a hazard to public health based on the total of 29 percent of modeled watersheds potentially at-risk. Our analyses show that of the 29 percent of watersheds with population at-risk, in 10 percent of those watersheds U.S. EGU

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[102] *Id.*

[103] Wiedinmyer, C., Friedli, H., 2007. "Mercury emission estimates from fires: An initial inventory for the United States." *Environmental Science & Technology* 41, 8092–8098.

deposition alone leads to potential exposures that exceed the MeHg RfD, and in 24 percent of those watersheds, total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition. The ENVIRON report provides no risk analysis of EGU contribution.

The EPA disagrees that research[104] [105] presented by the commenter shows that U.S. EGU impacts are over-estimated. The commenter's references do not support this statement. The references provided by the commenter are based on Hg modeling that uses models that are no longer applied and that are based on out-dated Hg chemistry and deposition assumptions. Given the advances in Hg modeling since the early 2000s, the EPA does not believe an upper and lower bound estimate is necessary.

2. Chemical Reactions

Comment: Several commenters stated that the CMAQ modeling fails to account for the chemical reduction of gaseous ionic Hg to elemental Hg that may occur in EGU plumes. The commenters noted that EPA did not use the Electric Power Research Institute's (EPRI) Advanced Plume-in-Grid Treatment, which includes a surrogate reaction to reduce gaseous ionic Hg to elemental Hg inside plumes. Multiple commenters claimed that the reduction of reactive gaseous Hg to gaseous elemental Hg has been reported in power plant plumes and that supporting data include atmospheric concentrations of speciated Hg measured downwind of power plant stacks at ground-level monitor sites and dispersion model predic-

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[104] Seigneur *et al.*, 2003.

[105] Seigneur *et al.*, 2004.

tions.[106] [107] A detailed description of various plume measurement studies is provided in EPRI Comments, Section 3.4: Plant Bowen, Georgia, Plant Pleasant, Wisconsin, and Plant Crist, Florida. One commenter believed the impact of grid resolution (12 km sized grid cells) on the CMAQ modeling was not appropriately addressed by EPA. Their concerns due to grid resolution include the notion that a source's emissions will be averaged over the entire grid cell. According to the commenter, such averaging causes an artificially fast dilution that smoothes out areas of high and low deposition, which may limit the ability of the model to simulate smaller areas of localized high deposition. This commenter believed that using the APT would address these issues.

Response: The EPA disagrees with the commenters' claims that oxidized Hg chemically reduces to elemental mercury within the plume. There is no evidence of these chemical reactions in the scientific literature. The references cited by the commenters are from non-peer reviewed reports and conference proceedings. The EPA does not consider information presented at conferences or industry reports to be peer reviewed literature, and consideration of oral presentation material would be inappropriate. Further, even these cited references do not provide sufficient information for incorporating the supposed reactions into the modeling (*e.g.*, specific chemical reactions, reaction rates, etc.); rather, the cited references only suggest that oxidized gas phase Hg could be reduced and postulate a possible pathway.

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Recent studies in central Wisconsin and central California suggest the opposite may happen; elemental Hg may be oxidized to Hg(II) in plumes.[108] [109] Better field study measurements and specific reaction mechanisms need to be identified before making conclusions about potential Hg in-plume chemistry or applying surrogate reactions in regulatory modeling. Currently, models such as Advanced Plume Treatment (APT) use a surrogate reaction for the potential reactive gas phase Hg reduction that may or may not occur in plumes.[110] Reactions that may reduce gas phase oxidized Hg in plumes have not been explicitly identified in literature. The application of potentially erroneous in-plume chemistry that is a fundamental component of APT would be inappropriate. In addition, the APT is not available in the most recent version of CMAQ. It would be inappropriate for EPA to apply an out of date photochemical model with in-plume chemistry that has not been shown to exist.

The EPA agrees with the commenter that the CMAQ modeling with 12 km grid resolution may provide a lower bound estimate on EGU contribution as higher impacts using finer grid resolution are possible. The commenter's assertion that EGU impacts are likely higher further supports the final conclusions of the exposure modeling assessment. The EPA notes that the application of a photochemical model at a 12 km grid resolution for the entire continental U.S. is more robust in terms of grid resolution and

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[108] Kolker et al., 2010.

[109] Rothenberg *et al.*, 2010.

[110] Vijayaraghavan, K., Seigneur, C., Karamchandani, P., Chen, S.Y., 2007. "Development and application of a multipollutant model for atmospheric mercury deposition." Journal of *Applied Meteorology and Climatology* 46, 1341–1353.

scale that anything published in literature and represents the most advanced modeling platform used for a national Hg deposition assessment.

3. Modeled Deposition Compared to Measured Deposition

Comment: Multiple commenters expressed dissatisfaction related to EPA's model performance evaluation of CMAQ estimated Hg deposition. The commenters stated that EPA failed to evaluate the CMAQ model against real-world measurements and that EPA fails to provide first-hand information on wet and dry deposition processes. The commenters also stated that EPA needs to assess how predicted values of deposition compare to Mercury Deposition Network (MDN) data and how predicted values of ambient speciated Hg concentrations compare to measurement networks like AMNet and SEARCH. In addition, commenters stated that EPA used highly aggregated performance metrics comparing model estimates to observations that they believe result in a degraded and lenient operational evaluation of the modeling system. A commenter suggested that EPA's model performance provides no confidence for the intended purpose of estimating deposition near point sources. One commenter simply noted that EPA's model over-estimated total Hg wet deposition at MDN monitors. Finally, several commenters noted that EPA presented a negative modeled wet deposition total in the Air Quality Modeling TSD, which is physically impossible.

Response: EPA agrees with the commenters that the negative estimate for wet deposition in the Air Quality Modeling TSD was an error. This error reflected an incorrect calculation in the post-processing

of model and observation pairs that only influenced the calculation of model performance metrics. The error has been fixed, and the model performance metrics in the revised Air Quality Modeling TSD have been updated. This error did not affect Hg deposition. In response to comments, the EPA provided additional model performance evaluation by season to the revised Air Quality Modeling TSD. In addition, in response to comments, the EPA also included model performance evaluation for total Hg wet deposition for the 36 km modeling domain in the revised Air Quality Modeling TSD.

The EPA disagrees that it did not conduct an assessment comparing CMAQ total Hg wet deposition estimates to MDN data. The Air Quality Modeling TSD clearly shows a comparison of CMAQ estimated total Hg wet deposition with MDN data for the entire length of the modeling period. The CMAQ wet deposition of Hg has been and will continue to be extensively evaluated against MDN sites.[111] There is no dry deposition monitoring network, which precludes evaluating CMAQ dry deposition processes. The EPA disagrees that an evaluation of ambient speciated Hg against routine monitor networks such as AMNet or SEARCH would be useful for this particular modeling application. The AMNet Hg network did not exist in 2005, which is EPA's baseline model simulation time period, and the SEARCH network started making preliminary measurements of Hg at one or two

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[111] Bullock, O.R., Atkinson, D., Braverman, T., Civerolo, K., Dastoor, A., Davignon, D., Ku, J.Y., Lohman, K., Myers, T.C., Park, R.J., Seigneur, C., Selin, NE., Sistla, G., Vijayaraghavan, K., 2009. "An analysis of simulated wet deposition of mercury from the North American Mercury Model Intercomparison Study." *Journal of Geophysical Research-Atmospheres* 114.

sites in 2005. In addition, measurement artifacts related to gaseous oxidized Hg are difficult to quantify and make direct comparison to model estimates problematic.[112] Considering the problems associated with TEKRAN measurements of ambient Hg and the sparse nature of routine measurements in the U.S., the EPA did not compare ambient Hg against model estimates.

The EPA disagrees that the model performance presented in the air quality TSD is insufficient. The EPA asserts that the model performance evaluation is generally similar to the level of model performance presented in literature. One commenter presented the results of several Hg modeling studies as providing information that the commenter believes to be relevant for this assessment in terms of model performance metric estimation and the level of model performance evaluation shown for assessments modeling Hg near point sources. For example, one cited study titled "Modeling Mercury in Power Plant Plumes" models near-source Hg chemistry from U.S. EGUs, but provides absolutely no information about model performance evaluation.[113]

Another commenter identified two studies as supposedly having Hg modeling results that are applicable to EPA's analysis.[114] [115] These studies present

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[112] Lyman, S.N., Jaffe, D.A., Gustin, M.S., 2010. "Release of mercury halides from KCl denuders in the presence of ozone." *Atmospheric Chemistry and Physics* 10, 8197–8204.

[113] Lohman *et al.*, 2006.

[114] Seigneur, C., Lohman, K., Vijayaraghavan, K., Jansen, J., Levin, L., 2006. "Modeling atmospheric mercury deposition in the vicinity of power plants." *Journal of the Air & Waste Management Association* 56, 743–751.

similar model performance metrics as EPA. The EPA disagrees that the Agency used "highly aggregated performance metrics" that result in degraded and lenient model evaluation. The studies presented [116] [117] as relevant for point source mercury modeling use an approach to aggregate the operational performance metrics across many monitor locations as did EPA; however, these articles calculate long term annual averages of modeled and observed total Hg wet deposition before estimating performance metrics. It is common practice to pair modeled estimates and observations in space and time (weekly in this case) and estimate performance metrics, then average all the metrics together. The latter is the approach taken by the EPA and should have been taken by the studies presented by the commenter. The EPA used a more stringent approach to match observations and predictions and aggregation of operational model performance. The EPA agrees that the commenter accurately restated total wet deposition model performance information provided by the EPA in the Air Quality Modeling TSD. To provide context, other Hg modeling studies show a positive bias for annual total

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[115] Vijayaraghavan, K., Karamchandani, P., Seigneur, C., Balmori, R., Chen, S.–Y., 2008. "Plume-in-grid modeling of atmospheric mercury." *Journal of Geophysical Research-Atmospheres* 113.

[116] Seigneur, C., Lohman, K., Vijayaraghavan, K., Jansen, J., Levin, L., 2006. "Modeling atmospheric mercury deposition in the vicinity of power plants." *Journal of the Air & Waste Management Association* 56, 743–751.

[117] Vijayaraghavan, K., Karamchandani, P., Seigneur, C., Balmori, R., Chen, S.-Y., 2008. "Plume-in-grid modeling of atmospheric mercury." *Journal of Geophysical Research-Atmospheres* 113.

Hg wet deposition.[118] [119] An annual Hg modeling application done by ENVIRON [120] and the Atmospheric and Environmental Research for Lake Michigan Air Directors Consortium show seasonal average normalized bias between 70 and 158 percent and seasonal average normalized error between 72 and 503 percent.[121] These results indicate a very large overestimation tendency. The model performance shown by EPA is consistent with other long-term Hg modeling applications.

4. Excess Local Deposition From Hg Emissions From U.S. EGUs (Deposition Hotspots)

Comment: One commenter stated that reducing Hg will benefit local environments. The commenter stated that a 2007 study confirmed the presence of Hg "hotspots" downwind from coal-fired power plants and confirmed that coal-fired power plants within the U.S. are the primary source of Hg to the Great Lakes and the Chesapeake Bay.[122] The commenter also stated that the study is consistent with a major Hg deposition study conducted by the EPA and the University of Michigan that concluded that approximate-

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[118] *Id.*

[119] Vijayaraghavan *et al.*, 2007.

[120] Yarwood, G, Lau, S., Jia, Y., Karamchandani, P., Vijayaraghavan, K. 2003. Final *Report: Modeling Atmospheric Mercury Chemistry and Deposition with CAMx for a 2002 Annual Simulation.* Prepared for Wisconsin Department of Natural Resources. *http://www.gypsymoth.wi.gov/air/toxics/ mercury/hg_X97579601_appB.pdf.*

[121] Yarwood *et al.*, 2003.

[122] Evers, David C. *et al.*, 2007. "Biological Mercury Hotspots in the Northeastern United States and Southeastern Canada," *Bioscience.* Vol. 57 No. 1. p. 29.

ly 70 percent of Hg wet deposition resulted from local fossil fuel emissions in the region.[123]

One commenter agreed with the Agency's assessment of the potential for deposition "hotspots" that shows that Hg deposition near EGUs can be three times as large as the regional average. The commenter stated that this excess Hg deposition would substantially increase the health and environmental risks associated with emissions at these sites. The same commenter also stated that EPA applied a conservative methodology to quantify near-source Hg deposition. The commenter stated that maximum excess local Hg deposition may be significantly underestimated by averaging high deposition sites downwind of an EGU in the direction of prevailing winds with lower excess deposition at locations close to but frequently upwind of the facility. The same commenter suggests that had EPA used CMAQ and individual 12x12 km^2 grid cells to quantify local deposition, the model could increase the excess Hg deposition at these locations significantly and place them at even greater risk of adverse health and environmental effects of HAP from U.S. EGUs.

One commenter stated that the Hubbard Brook Research Foundation issued a report in 2007 that identified five Hg hotspots, one of which was in the Adirondack Park, along with four suspected hotspots.[124]

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[123] Cohen, *et al.*, 2004. "Modeling the Atmospheric Transport and Deposition of Mercury to the Great Lakes," *Environmental Research 95*, (247–265).

[124] Driscoll, C.T., D. Evers, K.F. Lambert, N. Kamman, T. Holsen, Y-J. Han, C. Chen, W. Goodale, T. Butler, T. Clair, and R. Munson. Mercury Matters: Linking Mercury Science with Public Policy inthe Northeastern United States. 2007. Hubbard

The commenter stated that this study also provides a good description of the impacts of Hg on the Common Loon, which is a symbol of a healthy Adirondack environment.

One commenter stated that there is there is no evidence of Hg hotspots due to local deposition associated with coal-fired power plants. According to the commenter, the EPA's use of a 50 km radius to calculate hotspots is flawed. The commenter stated that modeling studies show that deposition of Hg emitted from power plants is not confined to a 50-km radius around the plants and that most emissions from power plants travel beyond 50 km.[125]

Several commenters stated that the EPA does not adequately define hotspots in this proposed rule. Those same commenters cited a previous EPA definition of hotspots as "a waterbody that is a source of consumable fish with MeHg tissue concentrations, attributable solely to utilities, greater than EPA's MeHg water quality criterion of 0.3 mg/kg" (milligrams per kilogram).[126] The same commenters stated that it is unclear why EPA changed from defining a hotspot by fish tissue MeHg concentration to defining a hotspot by depositional excess. Two commenters suggested that a Hg hotspot is a specific location that is characterized by elevated concentrations of Hg

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Brook Research Foundation. Science Links Publication. Vol. 1, no. 3.

[125] Seigneur *et al.*, 2006.

[126] U.S. EPA, 2005. 40 CFR Part 63 [OAR–2002–0056; FRL–7887–7] RIN 2060–AM96. *Revision of December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units and the Removal of Coal- and Oil-Fired Electric Utility Steam Generating Units From the Section 112(c).* Final rule, March 29.

exceeding a well-established criterion, such as a reference concentration (RfC) when compared to its surroundings. Those same commenters stated that identifying Hg hotspots should not be constrained to locations where concentrations can be attributed to a single source or sector.[127] One of those two commenters noted that others have defined "hotspots as a spatially large region in which environmental concentrations far exceed expected values, with such values (i.e. concentrations) being 2 to three standard deviations above the relevant mean."[128]

One commenter stated that Hg concentrations are not always highest at sites closest to a major source. The commenter referred to a study[129] that demonstrated that concentrations of atmospheric reactive gaseous Hg, gaseous elemental Hg, and fine particulate Hg were lower when measured 25 km from a 1,114 MW coal-fired EGU than when measured 100 km away. The commenter stated that these findings contradict the idea, implicit in EPA's hotspot analysis, that reactive gaseous Hg decreases with distance from a large point source.

One commenter provided information from a non-peer reviewed report with wet Hg deposition measurements downwind from the coal-fired power plant Crist in Pensacola, FL. The commenter stated that using the same data from these same wet deposition

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[127] Evers *et al.*, 2007.

[128] Sullivan T., 2005. "The Impacts of Mercury Emissions from coal-fired Power Plants on Local Deposition and Human Health Risk." Presented at the Pennsylvania Mercury Rule Workgroup Meeting, October 28.

[129] Kolker, *et al.*, 2010.

sites, one study[130] found that Hg wet deposition and concentrations did not differ in a statistically significant manner among these three sites and that the concentrations values were similar to those from Mercury Deposition Network (MDN) sites that are more than 50 km away from Plant Crist located along the Northern Gulf of Mexico coast.

Another commenter stated that Plant Crist installed a wet scrubber and has operated that scrubber continuously since December 2009. The commenter stated that the scrubber reduces total Hg emissions by about 70 percent and reduces emissions of reactive gaseous Hg by about 85 percent. The commenter cited a non-peer reviewed conference presentation[131] that reported changes in Hg wet deposition relative to historic measurements. The commenter stated that, taken collectively, these findings show that increased local total Hg deposition, possibly due to EGUs, and deposition changes due to changes in EGU emissions, are small.

Two commenters stated that a study by the Department of Energy (DOE) that collected and analyzed soil and vegetation samples for Hg near three U.S. coal-fired power plants—one in North Dakota,

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[130] Caffrey, J.M., Landing, W.M., Nolek, S.D., Gosnell, K.J., Bagui, S.S., Bagui, S.C., 2010. "Atmospheric deposition of mercury and major ions to the Pensacola (Florida) watershed: spatial, seasonal, and inter-annual variability." *Atmospheric Chemistry and Physics* 10, 5425–5434.

[131] Krishnamurthy N., Landing W.M, Caffrey J.M., 2011. "Rainfall Deposition of Mercury and Other Trace Elements to the Northern Gulf of Mexico." Presented at the 10th International Conference on Mercury as a Global Pollutant, Halifax, Nova Scotia, Canada, July 27.

one in Illinois, and one in Texas—found no strong evidence of "hotspots" around these three plants.

Two commenters stated that analysis of long-term trends in Hg emissions from coal-fired EGUs and wet deposition in Florida concluded that statistical analysis does not show evidence of a significant relationship between temporal trends in Hg emissions from coal-fired EGUs in Florida and Hg concentrations in precipitation during 1998 to 2010.

Two commenters stated that the Hg Risk TSD presents no information, summary statistics, and/or actual calculations showing how excess deposition within 50 km of an EGU source is obtained. The commenters stated that by assessing only Hg deposition attributable to EGUs, the EPA fails to provide a context for all other sources of Hg deposition. The commenters stated that the Agency does not explain why deposition from the top 10 percent of EGU Hg emitters does not decline, despite substantial reductions in modeled Hg emissions from those sources between 2005 and 2016.

According to the commenters this implies that the top 10 percent EGUs may have approximately as much of a regional effect as a local effect.

Two commenters stated that the CMAQ model has limitations when used to predict local deposition and tends to overestimate local deposition. The commenters stated that modeling studies using either a plume model or an Eulerian model predict that 91 to 96 percent of the Hg emitted by an EGU travels beyond 50 km.[132]

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[132] Edgerton *et al.*, 2006.

Response: The EPA agrees with the commenters that stated that Hg emissions from EGUs deposit locally and regionally and contribute to excess local deposition near U.S. EGUs. The EPA acknowledges additional studies[133] cited by those commenters that corroborate EPA's conclusions. However, the EPA disagrees with those commenters' characterization of the methodology used to calculate the potential for excess local deposition. In response, the EPA has clarified the methodology in the new TSD entitled "Technical Support Document: Potential for Excess Local Deposition of U.S. EGU Attributable Mercury in Areas near U.S. EGUs," which is available in the docket.

The EPA agrees that there is no generally agreed-upon definition of "hotspot." As discussed in the preamble and TSD, for the purposes of the appropriate and necessary finding, the EPA determined that information on the potential for excess deposition of Hg in areas surrounding power plants would be useful in informing the finding. The EPA disagrees with some commenters who misinterpreted the intent of the Hg deposition hotspot analysis. Specifically, the analysis is not of "Hg hotspots", which are often defined as high Hg concentration in fish, but rather of Hg deposition hotspots, defined as excess local Hg deposition around U.S. EGUs, as clarified in the new Local Deposition TSD. Because EPA did not identify "Hg hotspots" of high Hg concentrations in fish, the EPA's MeHg water quality criterion of 0.3 mg/kg is irrelevant to EPA's analysis of excess local Hg deposition for this rule.

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[133] Driscoll *et al.*, 2007.

The EPA disagrees that the analysis assumes that deposition of Hg is confined to a 50-km radius around power plants. The purpose of the EPA's analysis was to evaluate whether there existed "excess deposition of Hg in nearby locations within 50 km of EGUs that might result in Hg deposition 'hotspots'." As explained further in the new TSD, the EPA calculated the average EGU-attributable deposition (based on CMAQ modeling of Hg deposition) in the area 500 km around each plant and the average EGU-attributable deposition in the area 50 km around each plant. The difference between those two values is the excess local deposition around the plant. The EPA does not suggest Hg emissions from power plants stop at 50 km from the source. Some portion of EGU emissions deposit before 50 km, and some portion travels beyond 50 km. In addition, Hg disperses as it transports, so the average EGU contribution can be lower in areas beyond 50km relative to areas within 50km even though Hg emissions from EGUs are depositing into U.S. watersheds.

The EPA disagrees with some commenters' interpretation of the analysis as being focused on local deposition from all sources. In fact, the focus was on excess local deposition, rather than all local deposition. The EPA has clarified the purpose of the excess local deposition analysis in the new TSD. The EPA agrees that all EGUs add to local deposition, however, not all EGUs have local deposition that greatly exceeds regional deposition, which is the relevant question. The EPA disagrees that the DOE study referenced by the commenters attempted to assess the same analytical question as EPA's analysis. The DOE study focused on comparisons of total deposition near and far from power plants. The EPA's analysis

did not focus on total Hg deposition, because as EPA acknowledges throughout its analysis, global sources of Hg deposition account for a large percentage of total Hg deposition. In addition, including global sources of Hg deposition would obscure the comparison of local and regional U.S. EGU-attributable Hg deposition. Because of regional deposition from both domestic and global sources of Hg, total Hg deposition at any location is unlikely to be highly correlated with local sources. The EPA's analysis focused on U.S. EGU-attributable Hg deposition and demonstrates that for some plants (especially those with high Hg emissions), there is local deposition of Hg that exceeds the average regional deposition around the plant.

The EPA's analysis shows heterogeneity in the amount of excess local deposition around plants. The new Local Deposition TSD shows that some plants can have local deposition that is less than the regional average deposition, suggesting that most of the Hg from those plants is transported regionally or that other EGUs in the vicinity of those plants dominate the deposition of Hg near the plants. This does not detract from the overall finding that around some power plants with high levels of Hg emissions excess local deposition is on average three times the regional EGU-attributable deposition around those plants.

The EPA disagrees that the Hg Risk TSD did not provide sufficient information regarding the excess local deposition calculation. Nonetheless, the EPA has further clarified the methodology in the new Local Deposition TSD, including further descriptions of the method used to calculate the local and regional

deposition around power plants along with maps and tables of results.

The EPA disagrees with the commenters that stated that the discussion of local deposition in the Hg Risk TSD did not demonstrate that Hg deposition from the top 10 percent of EGU Hg emitters declines. Table 1 of the new Local Deposition TSD clearly shows that mean local deposition (within 50km of a plant) for the top 10 percent of emitters declines from 4.89 micrograms per cubic meter ($\mu g/m^3$) to 1.18 $\mu g/m^3$. What does not change is the percent local excess for EGU-attributable Hg deposition. This implies that while Hg deposition from EGUs is declining, there is still an excess contribution to local deposition relative to regional deposition; *e.g.*, because of dispersion, the contribution to average deposition outside 50 km from the plant is lower than the contribution to average deposition within 50 km of the plant.

The EPA disagrees that the information[134] provided by the commenter regarding the Crist plant and other coal-fired power plants in Florida is relevant to EPA's analysis of excess local deposition from U.S. EGUs because it is based on measurements of wet Hg deposition without consideration of dry Hg deposition, which can be a significant component of Hg deposition.

The EPA disagrees with the commenter regarding the interpretation of the literature related to the spatial extent of deposition of Hg emitted by U.S. EGUs. The EPA also disagrees that the peer-reviewed CMAQ model has limitations for this application or

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[134] EPRI, 2010.

overestimates local deposition. The commenter does not provide any credible support for the assertion that grid-based models typically overestimate local deposition surrounding EGUs. The EPA maintains that the CMAQ photochemical model represents the best science currently available in simulating atmospheric chemistry, transport, and deposition processes.

The study[135] cited by the commenter to support the notion that 91 to 96 percent of Hg emitted from power plants travels beyond 50 km is based on a photochemical transport model (the TEAM model) that does not employ current state-of-the-science and is not actively developed or updated. Furthermore, the modeling is based on grid cells that are 20 km in size, which limits generalizability to EPA modeling performed at 12 km grid resolution using a state of the science photochemical grid model. The cited modeling study ignores dry deposition of elemental Hg from all sources, an assumption that clearly limits the regional impacts from sources.[136] The methodology of this study cited by the commenter is critically flawed in that it presents no results where individual Hg emission sources are removed and the difference between the zero out simulation (where emissions from U.S. EGUs are set to zero) and the baseline model simulations are directly compared. Finally, the modeling study cited by the commenter presents an illustration of gridded total annual Hg deposition from the TEAM model for the eastern U.S. that clearly shows elevated annual total Hg deposition in the vi-

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[135] Seigneur *et al.*, 2006.

[136] *Id.*

cinity of coal-fired power plants in the Ohio River Valley and northeast Texas.

d. Hg Risk TSD

1. Assumption of Linear Proportionality in Relationship Between Changes in Hg Deposition and Changes in Fish Tissue Hg Concentrations (Mercury Maps)

Comment: Several commenters criticized EPA's assumption that changes in deposition resulting from U.S. EGU emissions of Hg will result in proportional changes in fish tissue Hg concentrations at the watershed level, as supported by the Mercury Maps modeling exercise. According to one commenter, the Mercury Maps model has limited capability to adequately determine bioaccumulation in fish. The same commenter stated that the Mercury Cycling Model (MCM) developed by EPRI is a more rigorous model that was developed expressly to evaluate the relationship between changes in atmospheric Hg deposition to waterbodies and changes in fish tissue MeHg levels.

Several commenters stated that the Mercury Maps model has many deficiencies. Those commenters stated that Mercury Maps is a static model unable to account for the dynamics of ecosystems that affect Hg bioaccumulation in fish, cannot consider non-air Hg inputs to watersheds, and assumes reductions in airborne Hg lead to proportional reductions in fish MeHg concentrations. Another commenter claimed that data that demonstrate a steady-state linear reduction in fish tissue MeHg in response to a reduction in atmospheric Hg deposition within watersheds do not exist and provided several references that they

claimed show non-linear responses to changes in Hg deposition.[137] [138]

The same commenter disagreed with EPA's interpretation of Figure 2–17 in the March TSD and stated that a U.S. Geological Survey national waterway study[139] showed that sheet flow and drainage, not deposition, dominated input to the waterbodies it surveyed. The commenter stated that sheet flow and drainage could contain Hg and thus complicate the relationship that EPA asserts is linear and direct. Another commenter cited Figure 2–17 in the Hg Risk TSD as showing that there is no well-defined relationship between Hg deposition and MeHg concentrations in fish tissue on a national basis.

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[137] Harris., R.C., John W.M. Rudd, Marc Amyot, Christopher L. Babiarz, Ken G. Beaty, Paul J. Blanchfield, R.A. Bodaly, Brian A. Branfireun, Cynthia C. Gilmour, Jennifer A. Graydon, Andrew Heyes, Holger Hintelmann, James P. Hurley, Carol A. Kelly, David P. Krabbenhoft, Steve E. Lindberg, Robert P. Mason, Michael J. Paterson, Cheryl L. Podemski, Art Robinson, Ken A. Sandilands, George R. Southworth, Vincent L. St. Louis, and Michael T. TateRudd, J. W.M., Amyot M., *et al.*, Whole-Ecosystem study Shows Rapid Fish-Mercury Response to Changes in Mercury Deposition. Proceedings of the National Academy of Sciences Early Edition, PNAS 2007 104 (42) pp. 16586–16591; (published ahead of print September 27, 2007).

[138] Orihel D.M., Paterson M.J., Blanchfield P.J., Bodaly R.A., Gilmour C.C., Hintelmann H., 2007. "Temporal Changes in the Distribution, Methylation, and Bioaccumulation of Newly Deposited Mercury in an Aquatic Ecosystem," *Environmental Pollution*, 154, 77–88.

[139] Scudder B.C., Chasar L.C., Wentz D.A., Bauch N.J., Brigham M.E., Moran P.W., Krabbenhoft D.P., 2009. *Mercury in fish, bed sediment, and water from streams across the United States, 1998–2005:* U.S. Geological Survey Scientific Investigations Report 2009–5109, 74 p.

Several commenters provided comments related to the assumption that fish tissue Hg levels used in the analysis represent a steady-state. One commenter stated that given the demonstrated lag time in response to deposition change, it is logical to conclude that a lag time needs to be incorporated in Mercury Maps to adjust the estimation of how much fish tissue MeHg levels decrease in response to decreases in Hg deposition attributable to U.S. EGUs. According to the same commenter, the METAALICUS study shows that there is a lag time (and a non-proportional response) after 3–4 years. The same commenter noted that there are numerous factors that influence lag time including (1) watershed characteristics,[140] (2) the fact that watersheds may act as legacy sources releasing Hg when disturbed,[141] (3) the magnitude of emission reductions and subsequent changes in atmospheric deposition need to be weighed against the amount of Hg already in an ecosystem,[142] (4) the distance of an ecosystem from Hg

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[140] Grigal D.F., 2002. "Inputs and Outputs of Mercury from Terrestrial Watersheds: A Review," *Environmental Review*, 10, 1–39.

[141] Yang H., Rose N.L., Battarbee R.W., Boyle J.F., 2002. "Mercury and Lead Budgets for Lochnagar, a Scottish Mountain Lake and Its Catchment," *Environmental Science & Technology*, 36, 1383–1388.

[142] Krabbenhoft D.P., Engstrom D., Gilmour C., Harris R., Hurley J., Mason R., 2007. Monitoring and Evaluating Trends in Sediment and Water Indicators. In Harris R., Krabbenhoft D., Mason R., Murray M.W., Reash R., Saltman T. (Eds.), *Ecosystem Responses to Mercury Contamination: Indicators of Change*. New York: Society of Environmental Toxicology and Chemistry (SETAC) North America Workshop on Mercury Monitoring and Assessment, CRC, pp. 47–87.

sources,[143] and (5) the fact that Hg deposited to aquatic ecosystems becomes less available for uptake by biota over time.[144] Another commenter stated that additional Mercury Maps assumptions do not allow for considerations of lag in response to changes in: (1) Deposition, (2) legacy sources of Hg such as mining, (3) historical Hg deposition, (4) natural Hg levels in fish, (5) ecosystem dynamics over time, or (6) the relative source contributions over time. Another commenter stated that lag times need to be included in the modeling and be able to vary from watershed to watershed and sometimes even from waterbody to waterbody within a watershed. Several commenters stated that the emission rates of Hg due to U.S. sources have been decreasing for more than a decade, while emissions due to sources outside the U.S. have been increasing. For this reason, the commenter asserted that the system is not at steady-state, a basic premise of the model. Another commenter stated that while the time lag for deposition to reach a waterbody is mentioned in the Hg Risk TSD, there is no discussion of the fact that a portion of the deposition is unlikely to reach the water at all.

One commenter believes EPA incorrectly implied that its EGU risk estimates using Mercury Maps are underestimated because they do not account for lega-

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[143] Lindberg S. *et al.* 2007. "A synthesis of progress and uncertainties in attributing the sources of mercury in deposition." Ambio 36(1): 19–32.

[144] Orihel D.M., Paterson M.J., Blanchfield P.J., Bodaly R.A., Hintelmann H., 2008. "Experimental Evidence of a Linear Relationship between Inorganic Mercury Loading and Methylmercury Accumulation by Aquatic Biota," *Environmental Science & Technology,* 41, 4952–4958.

cy EGU-attributable deposition, which EPA assumes to be higher.

One commenter stated that while EPA properly screened out watersheds with significant current non-air sources of Hg, the EPA did not adequately screen out watersheds with significant Hg contributions from non-air sources, specifically watersheds with historic Hg or gold mining or other industrial Hg discharges. The same commenter stated that EPA's study was not geographically balanced and was dominated by rivers in the coastal region of the southeast that has numerous wetlands, which are favorable locations for methylation and have conditions that are not typical of much of the rest of the U.S.

Response: The EPA disagrees with the commenters who challenged the assumption of a linear proportional relationship between changes in U.S. EGU deposition and fish tissue Hg levels. The EPA specifically asked the SAB to evaluate EPA's assumption of linear proportionality in the relationship between Hg deposition and fish tissue MeHg concentrations, supported by the Mercury Maps analysis. The SAB peer review committee provided the following overall response, which generally supports EPA's approach:

> The SAB agrees with the Mercury Maps approach used in the analysis and has cited additional work that supports a linear relationship between mercury loading and accumulation in aquatic biota. These studies suggest that mercury deposited directly to aquatic ecosystems can become quickly available to biota and accumulated in fish, and reductions in atmospheric mercury deposition should lead to decreases in methylmercury concentrations in biota. The

> SAB notes other modeling tools are available to link deposition to fish concentrations, but does not consider them to be superior for this analysis or recommend their use. The integration of Community Multiscale Air Quality Modeling System (CMAQ) deposition modeling to produce estimates of changes in fish tissue concentrations is considered to be sound. Although the SAB is generally satisfied with the presentation of uncertainties and limitations associated with the application of the Mercury Maps approach in qualitative terms, it recommends that the document include quantitative estimates of uncertainty available in the existing literature.[145]

The SAB peer review committee specifically addressed the MCM suggested by the commenter and had the following response:

> The SAB agrees with the application of Mercury Maps in this assessment. There are other modeling tools capable of making a national scale assessment, such as the Regional Mercury Cycling Model (R–MCM). However, the R–MCM is more data intensive and the results produced by the two model approaches should be equivalent.
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> The R–MCM, a steady-state version of the time-dependent Dynamic Mercury Cycling Model, has been publicly available to and used by the EPA (Region 4, Athens, Environmental Research Laboratory) for a number of years. R–MCM requires more detail on water chemistry, methylation potential, etc., and yields more information as well. Substantial data support the Mercury

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[145] U.S. EPA–SAB, 2011.

> Maps and the R–MCM steady-state results, so that the results of the sensitivity analysis and the outcomes from using the alternative models would be equivalent between the two modeling approaches. Though running an alternative model framework may provide additional reassurance that the Mercury Maps "base case" approach is a valid one, it is unlikely that substantial additional insight would be gained with the alternative model framework.[146]

In addition, the SAB stated, "Since the Mercury Maps approach was developed, several recent publications have supported the finding of a linear relationship between mercury loading and accumulation in aquatic biota.[147] [148] [149] These studies suggested that mercury deposited directly to aquatic ecosystems can become quickly available to biota and accumulated in fish, and that reductions in atmospheric mercury deposition should lead to decreases in methylmercury concentrations in biota. These results substantiate EPA's assumption that proportionality between air deposition changes and fish tissue methylmercury level changes is sufficiently robust for its application in this risk assessment."[150]

Based on the responses of the SAB peer review committee, the EPA's use of the linear proportionality assumption, supported by the Mercury Maps analysis, is well-supported.

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[146] U.S. EPA–SAB, 2011.
[147] Orihel *et al.*, 2007.
[148] Orihel *et al.*, 2008.
[149] Harris *et al.*, 2007.
[150] U.S. EPA–SAB, 2011.

The EPA also disagrees with commenters' interpretation of Figure 2–17. As stated in the Hg Risk TSD, while this figure is useful to demonstrate the lack of correlation across watersheds between total deposition of Hg and MeHg concentrations in fish tissue, it is not indicative of the likely correlation between changes in Hg deposition at a given watershed and changes in MeHg concentrations in fish tissue from that watershed. The SAB agreed with this interpretation, noting the importance of Figure 2–17 demonstrating that "spatial variability of deposition rates is only one major driver of spatial variability of fish methylmercury and that variability of ecosystem factors that control methylation potential (especially wetlands, aqueous organic carbon, pH, and sulfate) also play a key role."[151]

In response to recommendations from the SAB, the EPA expanded the discussion of uncertainties associated with the linearity assumption, including uncertainties related to the potential for sampled fish tissue Hg level to reflect previous Hg deposition and the potential for non-air sources of Hg to contribute to sampled fish tissue Hg levels. Each of these sources of uncertainty may result in potential bias in the estimate of exposure associated with current deposition. The EPA took steps to minimize the potential for these biases by (1) only using fish tissue Hg samples from after 1999, and (2) screening out watersheds that either contained active gold mines or had other substantial non-U.S. EGU anthropogenic emissions of Hg. The SAB commented that EPA's approach to minimizing the potential for these biases to affect the results of the risk analysis appears to be

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[151] U.S. EPA–SAB, 2011.

sound and that additional criteria that could be applied are unlikely to substantially change the results. As a result, the EPA disagrees with the commenter that EPA's screening process is inadequate. In addition, we conducted several sensitivity analyses to gauge the impact of excluding watersheds with the potential for non-EGU Hg emissions, and found that the results were robust to these exclusions.

In response to specific comments regarding the use of the Mercury Maps model, the EPA clarifies that the Hg Risk TSD did not directly use the Mercury Maps model. Instead, the EPA applied an assumption of linear proportionality between changes in Hg deposition and changes in MeHg concentrations in fish that is supported by the Mercury Maps modeling. By assuming steady-state conditions in apportioning fish tissue Hg levels and risk, the EPA does not attempt to project lag times. Recent research cited by the SAB[152] [153] [154] identifies relatively rapid response of fish tissue Hg to changes in Hg loading, which suggests that fish tissue Hg levels could react more quickly to reductions in Hg deposition than previously thought. This finding reduces concern that fish tissue Hg levels could be linked to older patterns of Hg deposition and strengthens the approach used in the revised Hg Risk TSD. While fish tissue may respond rapidly to changes in Hg loading, this does not change the fact that previously emitted Hg from U.S. EGUs can be re-emitted and re-deposited, and thus affect Hg concentration in fish.

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[152] Orihel *et al.*, 2007.
[153] Orihel *et al.*, 2008.
[154] Orihel *et al.*, 2007.

2. Characterization of Subsistence Fishing Populations and Exposure Scenario

Comment: Several commenters stated that EPA provides no clear definition of subsistence, near subsistence, or high-end fish consumption, instead assuming that poverty is a direct indication of subsistence fishing and high-end fish consumption. One commenter stated no documentation exists to supports these assumptions. Another commenter stated that EPA's definitions of subsistence fishers in the Hg Risk TSD are not consistent with earlier EPA documents and are used inconsistently throughout the Hg Risk TSD. Several commenters stated that while subsistence fishing can be associated with poverty, poverty does not indicate subsistence fishing. One commenter stated that by including watersheds with as few as 25 members of individuals living in poverty, the EPA overstates risks.

One commenter stated that it is unclear what literature the Agency says "generally supports the plausibility of high-end subsistence-like fishing * * * to some extent across the watersheds" and stated that if other studies exist, the EPA should provide the values for comparison.

One commenter stated that EPA combined two parameters with differing scales to establish the geographic unit used in the Hg Risk TSD risk assessment. The HUC watersheds are based on average about 35 square miles in size, while U.S. census tracts used to identify watersheds relevant for subpopulations of interest—cover a few tenths to hundreds of square miles. Several commenters stated that it is unclear how the analysis handled differ-

ences in geographic resolution between watersheds and census tracts were.

One commenter stated that the procedure for assigning census tracts could bias exposure outcomes. For example, the commenter stated that a single influential census tract in a watershed could drive risk, even if the watershed had only a minimal number of fish samples. The commenter stated that this possibility is a concern in urban areas, which account for the majority of census tracts, because these census tracts are more likely to be included in a risk analysis because they have more than 25 people living in poverty. The commenter stated that these census tracts may drive the extremes of the distribution without regard to the actual number of high-level, self-caught fish consumers within their boundaries. The commenter stated that they could not assess the potential bias and noted that EPA did not test the bias by sensitivity analyses.

Several commenters stated that EPA was not clear whether the poverty criteria were applied in all scenarios or just for the high-end female fish consumer scenario. One commenter stated that EPA should apply the minimum 25 source population criteria only to populations of women of childbearing age. One commenter stated that EPA's assumption would result in any densely populated urban census tract with a single fish tissue sample being assigned to a modeled watershed with populations potentially at-risk, regardless of the actual degree of recreational or subsistence fishing taking place there.

Response: The EPA agrees with the comments that subsistence fish consumption was not clearly defined, and we have provided a clearer definition in the re-

vised Hg Risk TSD, however, this clarification does not result in any changes to the quantitative analysis. In the revised Hg Risk TSD, the EPA clarifies that "subsistence fishers" are defined as individuals who rely on noncommercial fish as a major source of protein.[155] This definition is reflected in the range of fish consumption rates used in estimating risk. The likely presence of this type of subsistence fish consumer is supported by available peer reviewed literature (*see* Table 1–5 of the revised Hg Risk TSD). These studies clearly show that a subset of surveyed fishers consumes self-caught fish at the rates cited in the Hg Risk TSD. The SAB peer review concluded that the consumption rates and locations for fishing activity are supported by the data presented in the Hg Risk TSD, and are generally reasonable and appropriate given the available data.[156]

The EPA notes that there is some confusion in the comments related to the size of the watersheds modeled. Several commenters stated that HUC watersheds are 35 km on a side. The commenters appear to be referring to HUC8 classifications. The HUCs are defined for varying spatial resolutions. The geographic unit used as the basis for generating risk estimates is HUC12, which are watersheds about 10 km on a side, which is comparable with the size of the 12 km^2 grid cells in CMAQ, which are 12 km^2. The EPA has also clarified that the specific unit of analy-

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[155] U.S. EPA, U.S. Environmental Protection Agency. 2000. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories,* Volume 3: Overview of Risk Management. Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency, Washington, DC EPA 823–B–00–007.

[156] U.S. EPA–SAB, 2011.

sis for this assessment is at the watershed, not enumerated subpopulations.

The EPA only used the U.S. Census tracts to determine whether there are populations in the vicinity of a given watershed, which could increase the potential for a category of subsistence fishers to be active at that watershed. In the revised Hg Risk TSD, the EPA modified the female subsistence scenario to apply equally to all watersheds with fish tissue Hg data based on the likelihood that these populations have the potential to fish at most watersheds. As described in the revised Hg Risk TSD, the EPA made this change in response to SAB's concerns regarding the potential exclusion of watersheds with fewer than 25 individuals and regarding coverage for high-end recreational fish consumption.[157] Thus, concerns regarding the use of census data to select watersheds with the potential for subsistence fishing no longer apply to this scenario. However, for the remaining subsistence scenarios, the EPA continues to use U.S. Census tract-level data to evaluate the presence of a "source population" in the vicinity of the watershed being modeled for risk. In this context, the EPA uses the U.S. Census data to assess whether a socioeconomic status (SES)-differentiated group similar to the particular type of subsistence fisher being modeled (*e.g.*, poor Hispanics) are located in the vicinity of the watershed. If a source population is nearby, then this increases the potential that subsistence

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[157] This change led to a very small increase in the number of watersheds with populations potentially at-risk. In the Hg Risk TSD accompanying the proposed rule, approximately 4 percent of modeled watersheds were excluded based on the SES-based filtering criteria.

fishing activity could occur for that population scenario.

The EPA continues to model risk for white and black subsistence fishers active in the southeast and for Hispanics assessed nationally. In this case, the EPA links poverty with subsistence fishing, as EPA only modeled locations with poor source populations. However, in modeling these three populations, the EPA asserts that the presence of a poor source population indicates the potential for subsistence fishing activity, rather the presence of such activity. The linkage between poverty and higher rates of subsistence fish consumption is supported by the Burger *et al.* study,[158] which identified substantially higher consumption rates for poor individuals (*see* Table 5 of the study). The EPA acknowledges that subsistence fishing activity by specific subpopulations might only be present across a subset of the watersheds EPA modeled for risk. However, given the stated goal of the analysis to determine the percent of watersheds where the potential exists for exposures to U.S. EGU-attributable Hg to represent a public health hazard, identifying a set of watersheds with the potential for the type of high fish consumption that leads to high Hg exposure is appropriate. The EPA notes that relatively few watersheds (less than 4 percent) have fish tissue Hg data, and, thus, can be included in the risk assessment. Consequently, while there is the potential for including some watersheds in the analysis that may not have currently active subsistence fish-

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[158] Burger, J., 2002. "Daily Consumption of Wild Fish and Game: Exposures of High End Recreationists," *International Journal of Environmental Research and Public Health*, 12 (4), 343–54.

ing activity, it is likely that EPA excluded other watersheds from the analysis where this type of subsistence fishing activity occurs due to a lack of fish tissue Hg data.

While EPA agrees with the comment that it is likely that exposure to total MeHg through commercial fish consumption represents a more significant risk for the general population than consumption of freshwater fish obtained through self-caught fishing activity, exposure to total MeHg through self-caught fish consumption is the most significant risk for subsistence fishing populations and high-end recreational fishers. For the subset of these populations that focus their fishing activity in freshwater streams and lakes, it is also the case that they will experience a higher fraction of MeHg exposure attributable to U.S. EGU Hg emissions. As a result, the EPA focused the risk assessment on subsistence fishers active at inland freshwater watersheds because they are likely to experience the highest levels of individual risk as a result of exposure to U.S. EGU-attributable Hg.

3. Cooking Loss Adjustment Factor

Comment: Several commenters stated that EPA did not justify the selection of a cooking loss factor of 1.5 that, according to one commenter, increases estimated intake by 50 percent, thus increasing the daily MeHg intake rate by a constant factor of 33 percent and also increasing any resulting (HQ) risk estimate by a similar factor. Several commenters stated that the source of EPA's selected loss factor[159] reported a

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[159] Morgan, J.N., M.R. Berry, and R.L. Graves. 1997. "Effects of Commonly Used Cooking Practices on Total Mercury Concentration in Fish and Their Impact on Exposure Assess-

range of cooking losses from 1.1 to 6. Several commenters cite several studies that report no or highly variable changes in MeHg levels as a result of cooking fish.[160] [161] [162] [163] [164] One commenter suggested that EPA's cooking loss adjustment factor of 1.5 is at the high-end of the values supported by the literature. Another commenter stated that EPA has used other adjustment factors in previous documents, and that the adjustment factor should not be fixed across different populations given potential differences in cooking practices. Several commenters noted that the cooking loss adjustment factor should only be applied to estimates of consumption rates for prepared fish, and that some sources of consumption rates are based on raw fish.

Response: The EPA disagrees with the commenters that the selection of the cooking loss factor of 1.5 is

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ments." *Journal of Exposure Analysis and Environmental Epidemiology* 7(1):119–133.

[160] Armbruster G., Gerow K.G., Lisk D.J., 1988. "The Effects of Six Methods of Cooking on Residues of Mercury in Striped Bass," *Nutrition Reports International*, 37, 123–126.

[161] Gutenmann, W.H. and Lisk D.J., 1991. "Higher Average Mercury Concentration in Fish Fillets after Skinning and Fat Removal," *Journal of Food Safety*, 11, 99–103.

[162] Farias L.A., Favaro, D.I., Santos J.O., Vasconcellos M.B., *et al.*, 2010. "Cooking Process Evaluation on Mercury Content in Fish," *Acta Amazonia*, 40 (4), 741–748.

[163] Perelló G., Martı´-Cid R., Llobet J.M., Domingo J.L., 2008. "Effects of Various Cooking Processes on the Concentrations of Arsenic, Cadmium, Mercury, and Lead in Foods," *Journal of Agricultural and Food Chemistry*, 156 (22), 11262–11269.

[164] Torres-Escribano S., Ruiz A., Barrios L., Vélez D., Montoro R., 2011. "Influence of Mercury Bioaccessibility on Exposure Assessment Associated with Consumption of Cooked Predatory Fish in Spain," *Journal of the Science of Food and Agriculture*, 91 (6), 981–6.

not justified by the literature. The EPA also disagrees with the comment that the cooking loss adjustment factor of 1.5 is at the high-end of the range of values in the literature. The EPA selected the Morgan study[165] as the basis for the food preparation/cooking adjustment factor because it focused on the types of freshwater fish species representative of what might be consumed by subsistence fishing populations (*i.e.*, walleye and lake trout). This study[166] provides a range of adjustment factors for each fish type including 1.1 to 1.5 for walleye and 1.5 to 2.0 for lake trout. Given these two ranges, the EPA determined it to be reasonable to take an intermediate value between the two ranges (*i.e.*, 1.5), rather than focus on either the highest or lowest values, which is not the most conservative assumption that the EPA could have made. This study[167] also explains that preparation/cooking of fish results in an increase in MeHg levels per unit fish because Hg concentrates in the muscle, while preparation/cooking tends to reduce non-muscle elements (*e.g.*, water, bone, fat).

Regarding the alternative studies identified by the commenters, the EPA disagrees that these studies considered collectively contradict the cooking loss factor in the analysis. Specifically, the first study[168] may have included measurement of non-fish components added to dishes (*e.g.*, onions, heavy breading etc.), which could dilute the post-cooking Hg measurements and give the appearance of a cooking loss even as actual fish tissue Hg levels could have in-

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[165] Morgan *et al.*, 1997.

[166] *Id.*

[167] *Id.*

[168] Farias *et al.*, 2002.

creased. In the second study,[169] the fish species are saltwater and not freshwater, and the authors note that the reduction of water and fat could increase in the Hg concentration without changing absolute content. The third study focused on measurement of *bioaccessible Hg* in raw and cooked fish.[170] However, available information currently allows us to specify the risk model in terms of total Hg intake, not bioaccessible Hg, thus, this article is potentially informative for guiding future research and methods development, not the current risk assessment. The fourth study[171] found a modest but statistically insignificant increase in Hg levels for most of the cooking methods assessed, which is directionally consistent with EPA's cooking loss adjustment. The fifth study[172] only addressed the issue qualitatively, thus cannot be used for the cooking loss factor. When considered collectively, the EPA disagrees that the additional studies identified by the commenter contradict the cooking loss factor used in the risk assessment and maintains that the Morgan study[173] remains the most applicable for characterizing cooking/preparation effects on Hg concentrations in fish.

The EPA agrees that application of the cooking loss adjustment factor is appropriate if the fish consumption rates are for *as cooked* or *as consumed* and not for raw fish. Careful review of the three studies used in the risk assessment to identify subsistence fisher consumption rates suggests that all three represent

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[169] Perelló *et al.*, 2008.

[170] Torres-Escribano *et al.*, 2011.

[171] Armbruster *et al.*, 1988.

[172] Gutenmann *et al.*, 1991.

[173] Morgan *et al.*, 1997.

annual-average daily intakes (g/day) of *as consumed* or *as cooked* fish. One study stated that they used models of portion or meal size servings (the size of the serving the respondent regularly eats).[174] Therefore, the EPA interprets the fish consumption rates provided in this study[175] as representing *as cooked/prepared* and not for raw fish and for that reason, application of a preparation/cooking adjustment factor is required. Another study [176] used different sized models of cooked fish filets and therefore these consumption rates are also interpreted as represented *as cooked/prepared* and not raw fish. One study[177] [178] queried survey responders for meal portion or serving size and therefore, the consumption rates do represent *as cooked/prepared.* Because all three studies provide consumption rates based on *as cooked/prepared* or as consumed, it is appropriate to apply the cooking loss adjustment factor in modeling exposure.

4. Fish Consumption Rates and Fish Tissue Hg Characterization

Comment: One commenter stated that in the past the Agency has recommended various default consumption rates (in the general range of 130 to <150

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[174] Burger *et al.*, 2002.

[175] *Id.*

[176] Shilling, Fraser, Aubrey White, Lucas Lippert, Mark Lubell (2010). Contaminated fish consumption in California's Central Valley Delta. Environmental Research 110, p. 334–344.

[177] Dellinger JA. 2004. "Exposure assessment and initial intervention regarding fish consumption of tribal members of the Upper Great Lakes Region in the United States." *Environ Res* 95:325–340.

[178] Personal communication, Dr. Dellinger, September 27, 2011.

g/day) to provide default intakes for subsistence fishers under the *Risk Assessment Guidance for Superfund (RAGS) or the Fish Advisory Guidance.*[179] [180] The commenter stated that these default consumption rates are derived from various studies and generally are based on 90th or 99th percentile distribution estimates. Another commenter stated that EPA's use of the 99th percentile fish consumption for its risk analysis is inconsistent with the Agency's risk assessment guidelines, which recommend evaluating a reasonable maximum exposure ("RME") scenario,[181] which equates to about a 95th percentile fish consumption value. The same commenter stated that EPA applied the 99th percentile to a "small survey of 149 South Carolina female anglers" to calculate an ingestion rate of 373 grams per day (g/day). The commenter stated that if the 95th percentile is used the ingestion rate would be 173 g/day and if the default ingestion rate for determining ambient water standards is used the ingestion rate would be 142 g/day.

Several commenters stated that EPA based its fish consumption rates used in the risk analysis on a limited number of studies and that those studies are poorly documented.

Another commenter stated that EPA should summarize available supporting studies by basic study

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[179] U.S. EPA. 1991. *Risk Assessment Guidance for Superfund (RAGS).* Part C 1991 EPA/9285.7–01C. October.

[180] U.S. EPA. 2000. *National Guidance: Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories,* Volume 2. EPA 823–B–00–008, November.

[181] U.S. EPA. 1989. *Risk Assessment Guidance for Superfund (RAGS).* EPA/540/1–89/002. December.

content, characteristics, design, size, demographics, dietary recall period, and fish intake rates by demographic variables. According to the commenter, this summary would support the scientific validity of the assessment and better illustrate the potential variability and uncertainty involved in extrapolating data from small populations to the national-scale. The commenter also noted that the three studies actually used to provide subsistence population estimates, which were extrapolated to the national-scale, included a limited number of individuals living in diverse and localized areas.

One commenter stated that the assumption with the greatest impact on risk is the fish consumption rate. That same commenter stated that using 99th percentile ingestion rate dramatically increases HQ and IQ loss compared to the 50th percentile ingestion rate. The commenter stated that when an estimate of the 95th percentile ingestion rate of the 15 to 44 year old female population is considered, the HQ is a tenth of the value computed with the 99th percentile high-end female fisher.

One commenter stated that EPA provides broad summary statistics of its fish tissue data in Table 5–2 of the Regulatory Impact Analysis (RIA), but the summary does not allow an assessment of the representativeness and robustness of the underlying data for the risk assessment, especially at the tails of the distribution. The commenter stated that the table does not include a median statistic and does not provide any information on the number of lakes and river segments in each watershed. According to the commenter, an analysis of EPA's database by the SAB indicated that 60 percent of the watersheds with

fish Hg data from rivers have risks calculated based upon a sample size of one or two fish. The commenter stated that it is not reasonable to base a significant policy and regulation decision on watersheds where exposure is based on a single fish sample in a single water body within it.

Several commenters criticized EPA's use of the 75th percentile fish tissue MeHg level in a watershed. One commenter stated that EPA provided no rationale for its decision to choose the highest of the 75th percentile for fish Hg levels among rivers and lakes within the HUC. Several commenters stated that subsistence fishers are less likely to target larger fish relative to recreational fishers. Several commenters suggested that EPA include a sensitivity analysis using the mean or median fish MeHg level in a watershed. One commenter also stated that EPA arbitrarily inflated the risk estimates by assuming consumption of only fish greater than 7 inches and choosing the largest of the 75th percentile of fish Hg levels from these larger fish (*i.e.*, larger than 7 inches) for rivers and lakes. That same commenter suggested using the median of all size fish, not just those over 7 inches.

One commenter stated that EPA should quantify adverse effects from the ingestion of MeHg in seafood in addition to ingestion of MeHg from self-caught freshwater fish. According to the commenter, recent studies demonstrate that were EPA to take into account consumption of seafood, MeHg consumption in the U.S. is of even greater concern.

Response: The EPA acknowledges that the focus of the Hg Risk TSD is characterizing risk for the groups likely to experience the greatest U.S. EGU-

attributable Hg risk, which are subsistence fishing populations active at inland freshwater lakes and rivers. Specifically, within that subsistence fishing population, the EPA is interested in those individuals who are most at-risk, which includes those who consume the most fish. For that reason, the EPA considered a range of high-end fish consumption rates including the 99th percentile representing the most highly-exposed individuals. In responding to the SAB peer review, the EPA clarified this focus in the introduction to the revised Hg Risk TSD and changed the full title to *revised Technical Support Document: National-Scale Assessment of Mercury Risk to Populations with High Consumption of Self-caught Freshwater Fish.*

The EPA agrees that the fish consumption rate is an important factor in calculating risk from exposure to MeHg in fish. The EPA acknowledges that the distribution of fish consumption rates is positively skewed, which means that at higher percentiles (*e.g.*, 90th, 95th, and 99th) there is a substantial increase in ingestion rates relative to the mean or median. The revised Hg Risk TSD includes a reasonableness check on the amount of fish consumed (as a daily value) reflected in the different rates. While the 99th percentile consumption rates for the subsistence female fisher (373 g/day) is substantially higher than the 90th or 95th percentile values (123 and 173 g/day respectively), the 99th percentile value translates into a 13-ounce meal. While this represents a large serving, it is still reasonable if representing an individual who receives all of their meat protein from self-caught fishing, and the 13 ounces per day do not have to be eaten all at one meal. The higher consumption rates (i.e., greater than 250 g/day) are sup-

ported by all three studies used in the risk assessment, and therefore, there is support across studies near the upper bound of likely consumption rates in this range. The EPA acknowledges uncertainty associated with estimating high-end percentile values in these studies due to relatively low sample sizes for some population groups. However, even if a few individuals reported these high self-caught fish consumption rates, making it difficult to characterize the population percentiles they represent, the values still suggest that these levels of high fish consumption exist among surveyed individuals. To determine whether a public health hazard could exist, the EPA asserts that it is reasonable to include these consumption rates as representative of the most at-risk populations. In these cases, however, the EPA acknowledges that it is important to highlight uncertainty associated with characterizing the specific population percentile that these ingestion rates represent, and EPA has done so in the revised Hg Risk TSD.

The EPA disagrees with the comment that high consumption rates are poorly documented. Evidence of these high fish consuming populations can be found in surveys[182] and specialized studies.[183] [184] [185]

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[182] Burger *et al.*, 2002.

[183] Burger, J., K. Pflugh, L. Lurig, L. Von Hagen, and S. Von Hagen. 1999a. "Fishing in Urban New Jersey: Ethnicity Affects Information Sources, Perception, and Compliance." *Risk Analysis* 19(2): 217–229.

[184] Burger, J., Stephens, W. L., Boring, C. S., Kuklinski, M., Gibbons, J. W., Gochfeld M. 1999b. "Factors in Exposure Assessment: Ethnic and Socioeconomic Differences in Fishing and Soncumption of Fish Caught along the Savannah River." *Risk Analysis*, Vol. 19, No. 3, p. 427.

[186] [187] Several studies identified additional fishing populations with subsistence or near subsistence consumption rates, including urban fishing populations (including low-income populations),[188] [189] [190] Laotian communities,[191] and Hispanics. The EPA participated in 1999 in a project investigating exposures of poor, minority communities in New York City to a number of contaminants including Hg, which found these populations can have very high fish consumption rates.[192] The SAB concluded that the consumption rates and locations for fishing activity are supported by the data presented in the Hg Risk TSD, and are generally reasonable and appropriate given the available data.[193]

The EPA agrees that the Hg Risk TSD would be improved by clarifying that the literature review focused on identifying studies that characterize subsistence fish consumption for groups active at freshwater locations within the U.S., and EPA has revised

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[185] California Environmental Protection Agency (CalEPA). 1997. *Chemicals in Fish Report No. 1: Consumption of Fish and Shellfish in California and the United States Final Draft Report.* Pesticide and Environmental Toxicology Section, Office of Environmental Health Hazard Assessment, July.

[186] Tai, S. 1999. "Environmental Hazards and the Richmond Laotian American Community: A Case Study in Environmental Justice." Asian Law Journal 6: 189.

[187] Corburn, J. 2002. "Combining community-based research and local knowledge to confront asthma and subsistence-fishing hazards in Greenpoint/Williamsburg, Brooklyn, New York." *Environmental Health Perspectives* 110(2).

[188] Burger *et al.*, 1999a.

[189] Burger *et al.*, 1999b.

[190] CalEPA, 1997.

[191] Tai, 1999.

[192] Corburn, 2002.

[193] U.S. EPA–SAB, 2011.

the Hg Risk TSD accordingly. In the Hg Risk TSD, the EPA summarized important study attributes for the source studies used to obtain fish consumption rates. This information was provided in Table C–1 in an appendix. To improve clarity, the EPA moved the summary table to the main body in the revised Hg Risk TSD. In identifying these studies, the EPA focused on surveys for subsistence fishers that were applicable at the broader regional or national level. In the Hg Risk TSD, the EPA acknowledged the smaller sample sizes for some of the subsistence fisher groups, and in several cases the EPA did not use the 99th percentile consumption rates because the sample sizes were too low to support this level of resolution. This decision did not affect EPA's finding of a hazard to public health, which is based on the results for the female subsistence fishing population, which has an estimate of the 99th percentile consumption rate that is supported by an adequate sample size.

The EPA disagrees with the comment that it did not provide a rationale for choosing the 75th percentile fish tissue concentration across lakes and rivers in a watershed. However, the EPA modified the methodology based on evaluation of the number of samples within each watershed (responding to a recommendation from the SAB). In the revised methodology, the EPA computes the 75th percentile value at each sampling site within a watershed. The EPA then computed the average of the site-specific 75th percentile fish tissue Hg values within a given watershed. This approach does not differentiate between rivers and lakes and reflects an improved treatment of behavior, allowing for fishers to choose among multiple fishing sites within a watershed.

The EPA generally agrees with the comment that some fraction of subsistence fishers likely consume fish without consideration for size (given dietary necessity), however, the EPA considers it reasonable to assume that a subset of subsistence fishers could target larger fish in order to maximize the potential consumption per unit of fishing effort. The EPA uses this subset of subsistence fishers targeting larger fish, which is represented by the 75th percentile fish tissue value, in the risk assessment. In addition, including the female subsistence fishing population in the analysis also provides coverage for high-end recreational anglers who target larger freshwater fish. The SAB commented that: "Using the 75th percentile of fish tissue values as a reflection of consumption of larger, but not the largest, fish among sport and subsistence fishers is a reasonable approach and is consistent with published and unpublished data on predominant types of fish consumed."[194] The SAB suggested that EPA include a sensitivity analysis based on use of the median value, and EPA has done so in the revised Hg Risk TSD. This sensitivity analysis showed that using the median estimates had only a small impact on the number and percent of modeled watersheds with populations potentially at-risk from U.S. EGU-attributable MeHg exposures. In the revised Hg Risk TSD, the EPA clarified that the 7-inch cutoff represents a minimum size limit for a number of key edible freshwater fish species established at the State-level. For example, Pennsylvania establishes 7 inches as the minimum size limit for both trout and salmon (other edible fish species such

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[194] U.S. EPA–SAB, 2011.

as bass, walleye and northern pike have higher minimum size limits).[195]

The EPA disagrees with the comment that it is not reasonable to use watersheds where only a single fish sample is available. Although it is generally preferred to have multiple samples, the SAB noted that using a single sample is likely to underestimate the 75th percentile fish MeHg concentration and is, therefore, likely to underestimate the risk estimates for those watersheds. The SAB suggested that EPA conduct additional analyses of the fish tissue MeHg data, which EPA has done and included in the revised Hg Risk TSD. The revised Hg Risk TSD includes information on the number of watersheds modeled in the risk assessment with various fish tissue Hg samples sizes (*e.g.*, 1, 2, 3–5, 6–10 and >10 measurements).

5. Reference Dose (RfD) for MeHg and Hg Health Effects Studies

Comment: Several commenters stated that EPA's RfD[196] is based on sound science, which was supported by the findings of the NAS Study,[197] and that EPA appropriately applied the RfD in the Hg risk assessment. The commenters also stated that recent studies find clear associations between maternal blood Hg

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[195] Pennsylvania Fish and Boat Commission. 2011. *Summary Book: 2011 Pennsylvania Fishing Laws & Regulations* available at: *http://fishandboat.com/fishpub/summary/inland.html.*

[196] U.S. Environmental Protection Agency—Integrated Risk Information System (U.S. EPA–IRIS). 2001. Methylmercury (MeHg) (CASRN 22967–92–6). Available at *http://www.epa.gov/iris/subst/0073.htm.*

[197] NAS, 2000.

levels and delayed child development and cardiovascular effects, as well as potential for effects due to exposure to pollutant mixtures including lead.

However, many commenters expressed concerns regarding EPA's use of the MeHg RfD as a benchmark for health risk. Several commenters raised concerns claiming that EPA has not incorporated the best available Hg toxicological data into the RfD, which results in a flawed analysis and an overestimate of the impact of Hg emissions on human health.

Several commenters stated that, when deriving the RfD, the EPA relied on the flawed Faroe Islands' children study and ignored the Seychelles Islands study,[198] which did not confirm any harm on children due to MeHg exposure. According to the commenters, application of the Faroe Island study is suspect because (1) the raw data from the study have never been made available for independent analysis and scrutiny, (2) there is potential for confounding by polychlorinated biphenyls (PCBs) and lead, (3) population exposure to MeHg was through consumption of highly contaminated pilot whale meats and blubbers, and (4) exposure levels in the U.S. remain lower than those observed in the primary study. One commenter also notes that (1) Seychelles Islanders consume far more fish than Americans do; (2) the amount of MeHg in the U.S. population is much lower than the Seychelles Islanders; and (3) all ocean fish contain about the same amount of MeHg, so MeHg intake per fish meal is similar between Americans and Seychelles Islanders. However, another commenter stat-

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[198] Budtz-Jorgensen E, Debes F, Weihe P, Grandjean P. 2005. "Adverse Mercury Effects in 7– Year-Old Children Expressed as Loss in "IQ"." EPA–HQ–OAR–2002–0056–6046.

ed that industry arguments against using the Faroe Islands study fail to acknowledge that the study results were consistent with studies in the Seychelles Islands, New Zealand,[199] and Poland.[200]

One commenter criticized EPA for using a linear dose-response model for the RfD-based HQ metric and the IQ metric. Another commenter stated that the RfD assumes a threshold dose below which an appreciable risk of adverse effects is unlikely, and NAS did not evaluate whether MeHg exposure data were better fit by a linear or non-linear model or by a threshold or non-threshold model.

Several commenters stated that EPA's MeHg RfD is more conservative than "safe" levels determined by other federal agencies and claim that EPA assigned unusually high uncertainty factors. Several commenters stated that EPA's use of the 1999 National Health and Nutrition Examination Survey (NHANES) blood Hg levels show a downward trend since 1999, and the levels have been below the RfD since 2001.

One commenter stated that a study by Texas Department of State Health Services (DSHS, 2004)[201]

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[199] Kjellstrom, T; Kennedy, P; Wallis, S; *et al.* 1986. *Physical and mental development of children with prenatal exposure to mercury from fish. Stage 1: Preliminary test at age 4.* Natl Swed Environ Protec Bd, Rpt 3080 (Solna, Sweden).

[200] Wieslaw Jedrychowski *et al.* 2006. "Effects of Prenatal Exposure to Mercury on Cognitive and Psychomotor Function in One-Year-Old Infants: Epidemiologic Cohort Study in Poland," 16 Annals of Epidemiology 439.

[201] DSHS. 2005. *Health Consultation: Mercury Exposure Investigation Caddo Lake Area-Harrison County Texas.* Agency for Toxic Substances and Disease Registry.

determined that among subsistence fishers who eat fish from Caddo Lake with elevated MeHg, women of child-bearing years did not have blood Hg levels greater than the RfD. Thus, according to the commenter, the connection between MeHg in fish and adverse health effects in the U.S. is not fully understood and could involve other factors, including the protective effects of fatty acids and selenium in fish, which EPA did not taken into account.

Two commenters claim that EPA uses the RfD as if it were an absolute threshold for health risk in the risk assessment even though the RfD methodology is a screening tool for deciding when risks clearly do not exist.

Several commenters recommended adding qualitative discussions to the Hg Risk TSD regarding several aspects of uncertainty, including uncertainty in the RfD, uncertainty in extrapolating a dose-response relationship between MeHg exposure and change in IQ, uncertainty in extrapolating the dose-response relationship from marine fish and marine mammals to freshwater fish, and uncertainty due to potential confounding by PCBs in marine species.

Several commenters raised concerns regarding the relationship between MeHg exposure and IQ loss. Two commenters stated that changes in IQ are not a well-defined health consequence of MeHg exposure. One commenter stated that the SAB had reservations about EPA's use of IQ loss. Two commenters questioned whether IQ impacts would even occur because in Japan and Korea, where the maternal blood Hg

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http://www.tceq.state.tx.us/assets/public/comm_exec/pubs/sfr/085.pdf.

levels are higher than in the U.S., there is no evidence of adverse effects. Another commenter cited a study[202] that found verbal IQ scores for children from mothers with no seafood intake were 50 percent more likely to be in the lowest quartile. One commenter questions using an IQ risk metric threshold of >1 or >2 points because variation in IQ measures and the intra-individual variation in IQ are higher than the threshold.

Several commenters question the relationship between cardiovascular effects and MeHg exposure. Two commenters cited studies examining the relationship between MeHg exposure and cardiovascular effects,[203] [204] [205] [206] [207] [208] but concluded that it seems

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[202] Hibbeln JR, Davis JM, Steer C, Emmett P, Rogers I, Williams C, *et al.*, 2007. "Maternal seafood consumption in pregnancy and neurodevelopmental outcomes in childhood (ALSPAC study): an observational cohort study. " Lancet 369:

[203] Roman HA, Walsh TL, Coull BA, Dewailly É, Guallar E, Hattis D, *et al.*, 2011. Evaluation of the Cardiovascular Effects of Methylmercury Exposures: Current Evidence Supports Development of a Dose–Response Function for Regulatory Benefits Analysis. Environ Health Perspect 119:607–614.

[204] Guallar E, Sanz-Gallardo MI, van't Veer P, *et al.*, 2002. "Mercury, fish oils, and the risk of myocardial infarction." N Engl J Med.;347:1747.

[205] Virtanen JK, Voutilainen S, Rissanen TH, *et al.*, 2005. "Mercury, fish oils, and risk of acute coronary events and cardiovascular disease, coronary heart disease, and all-cause mortality in men in eastern Finland." Arterioscler Thromb Vasc Biol. 2005;25:228.

[206] Yoshizawa, Rimm, Morris, Spate, Hsieh, Spiegelman, Stampfer, Willett. "Mercury and the Risk of Coronary Heart Disease in Men," N Engl J Med 2002; 347:1755–1760.

[207] Hallgren CG, Hallmans G, Jansson JH, *et al.*, 2001. Markers of high fish intake are associated with decreased risk of a first myocardial infarction. Br J Nutr: 86:397.

premature to use these studies to establish a dose-response relationship.

Several commenters assert that the risks from eating seafood are low relative to the benefits, that fish advisories can limit the beneficial aspects of fish consumption, and that fish advisories are often unsuccessful in changing behavior.[209] [210] One commenter noted the important protective role of dietary selenium against MeHg toxicity because the binding affinity of Hg to Se is much higher than binding to sulfur.

Response: The EPA agrees with commenters that state the MeHg RfD is the appropriate health value for determining elevated risks from MeHg exposure and disagrees with commenters that state otherwise. At this time, the EPA is neither reviewing nor revising its 2001 RfD for MeHg. The 2001 RfD for MeHg is EPA's current peer-reviewed RfD, which is the value EPA uses in all its risk assessments. The EPA's RfD is based on multiple benchmark doses, and RfDs were calculated on various endpoints using the three extant large studies of childhood effects of in utero exposure: Faroe Islands, New Zealand, and an integrative measure including data from Seychelles. The EPA did not choose to base the MeHg RfD solely on results from the Seychelles Islands, as both the NAS[211] and an independent scientific review panel

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[208] Mozaffarian, Dariush. 2011. "Mercury Exposure and Risk of Cardiovascular Disease in Two U.S. Cohorts," N Engl J Med 364: 1116–1125.

[209] Hibbeln *et al.*, 2007.

[210] Mozaffarian, *et al.*, 2011.

[211] NAS, 2000.

convened as part of the IRIS process[212] advised strongly against using results from a study that at the time had not shown an association between MeHg exposure and adverse effects. Further, the EPA disagrees with comments stating that EPA based the MeHg RfD solely on results from the Faroe Islands population and disagrees that the information underlying the RfD is "poorly explained". The EPA has provided detailed documentation for the choices underlying calculation of the RfD.[213] [214] [215] To correct a misunderstanding by the commenter, the data underlying the Faroe Islands study have been previously published in the peer reviewed literature.

The EPA disagrees that it did not incorporate the latest Hg data to support the appropriate and necessary finding. It is the policy of EPA to use the most current peer reviewed, publicly available data and methodologies in its risk assessments. However, the EPA noted in the preamble to the proposed rule that "data published since 2001 are generally consistent with those of the earlier studies that were the basis of the RfD, demonstrating persistent effects in the Faroe Island cohort, and in some cases associations of effects with lower MeHg exposure concentrations

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[212] U.S. EPA. 2001b. Responses to Comments of the Peer Review Panel and Public Comments on Methylmercury. Available on the Internet at *http://www.epa.gov/iris/supdocs/methpr.pdf.*

[213] U.S. EPA, 2001a. Water Quality Criterion for the Protection of the Human Health: MethylmercuryEPA–823–T–01–001, available at *http://water.epa.gov/scitech/swguidance/ standards/criteria/aqlife/pollutants/methylmercury/index.cfm.*

[214] U.S. EPA–IRIS, 2001.

[215] Rice D, Schoeny R, Mahaffey K. 2003. "Methods and Rationale for Derivation of a Reference Dose for Methylmercury by the U.S. EPA." Risk Analysis 23(1)107–115.

than in the Faroe Islands. These new studies provide additional confidence that exposures above the RfD are contributing to risk of adverse effects, and that reductions in exposures above the RfD can lead to incremental reductions in risk." However, the EPA has not completed a comprehensive review of the new literature, and as such, it would be premature to draw conclusions about the overall implications for the RfD.

The EPA agrees that EPA's RfD is not the same as the levels used by other federal agencies. In their advice to the EPA on the appropriate bases for a MeHg RfD, NAS specifically recommended that EPA use neither the study nor the uncertainty factor employed by the Agency for Toxic Substances Disease Registry (ATSDR) in the calculation of the minimal risk level.[216]

The EPA disagrees that the uncertainty factor is "unusually high". The uncertainty factor used in calculation of EPA's peer-reviewed RfD is small (10 fold); half of this factor is to account for measured variability in human pharmacokinetics, which is based on advice of the NAS[217] and an independent panel of scientific peer reviewers convened as part of the IRIS process.[218]

The IRIS makes this statement regarding a threshold for MeHg, "It is also important to note that no evidence of a threshold arose for methylmercury-related neurotoxicity within the range of exposures in the Faroe Islands study. This lack [of a threshold] is in-

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[216] NAS, 2000.

[217] Id.

[218] U.S. EPA, 2001b.

dicated by the fact that, of the K power models, K = 1 provided a better fit for the endpoint models than did higher values of K."[219]

The EPA disagrees that it is using the MeHg RfD as an absolute bright line for health effects in the risk assessment. As stated in the preamble to this proposed rule, the RfD is an estimate of a daily exposure to the human population that is likely to be without an appreciable risk of deleterious effects during a lifetime. The EPA also stated that no RfD defines an exposure level corresponding to zero risk. Because mercury is a cumulative neurotoxin, it is important to distinguish health effects from public health hazard. Within the context of the appropriate and necessary finding, we interpret a public health hazard as risk, rather than certain occurrence of health effects.

The EPA disagrees that exposure levels in the U.S. are lower than those in the Faroe Islands study. Exposure to MeHg in the U.S. has been reported at the same levels as those published in the Faroe Islands.[220] One study notes that in the NHANES data (1999 to 2004), the highest five percent of women's blood Hg exceeded 8.2 microgram per liter (μg/L) in the Northeast U.S. and 7.2 μg/L in coastal areas.[221]

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[219] U.S. EPA–IRIS, 2001.

[220] Schober Susan E, Sinks Thomas H, Jones Robert L, Bolger P Michael, McDowell Margaret, Osterloh John, Garrett E Spencer, Canady Richard A, Dillon Charles F, Sun Yu, Joseph Catherine B, Mahaffey Kathryn R. Blood mercury levels in U.S. children and women of childbearing age, 1999–2000. JAMA. 2003 Apr 2; 289(13): 1667–1674.

[221] Mahaffey, K.R., R.P. Clickner and R.A. Jeffries. 2009. Adult Women's Blood Mercury Concentrations Vary Regionally

Higher levels have been reported among subjects known to consume fish. For example, one study reported mean blood Hg for adult women to be 15 µg/L; range for men and women was 2 to 89.5 µg/L.[222] Note that some publications have reported Hg effects in U.S. populations at or below the current U.S. RfD.[223] [224] Also, the EPA disagrees with the commenter stating all ocean fish throughout the world contain about the same amount of MeHg. Marine fish in commerce differ widely in Hg concentration by species, and fish within the same species but caught at different locations have variable amounts of Hg in their tissues.[225] [226]

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in the U.S.: Association with Patterns of Fish Consumption (NHANES 1999–2004). *Environ. Health Perspect.*, 117: 47–53.

[222] Hightower Jane M, Moore Dan. Mercury levels in high-end consumers of fish. Environ Health Perspect. 2003 Apr; 111(4): 604–608.

[223] Oken, E., Radesky, J.S., Wright, R.O., Bellinger, D.C., Amarasiriwardena, C.J., Kleinman, K.P., Hu, H., Gillman, M.W. 2008. Maternal fish Intake during Pregnancy, Blood Mercury Levels, and Child Cognition at Age 3 Years in a U.S. Cohort. *American Journal of Epidemiology, 167(10)*, 1,171–1,181.

[224] Lederman, Sally Ann Robert L. Jones, Kathleen L. Caldwell, Virginia Rauh, Stephen E. Sheets, Deliang Tang, Sheila Viswanathan, Mark Becker, Janet L. Stein, Richard Y. Wang, and Frederica P. Perera. 2008. Relation between Cord Blood Mercury Levels and Early Child Development in a World Trade Center Cohort. *Environmental Health Perspectives* 118(8) 1085–1091.

[225] Hisamichi Y, Haraguchi K, Endo T. 2010. "Levels of mercury and organochlorine compounds and stable isotope ratios in three tuna species taken from different regions of Japan." *Environ Sci Technol* 44(15): 5971–8.

[226] Sunderland EM. 2007. "Mercury exposure from domestic and imported estuarine and marine fish in the U.S. seafood market." *Environ Health Perspect.* 115(2): 235–42. Epub 2006 Nov 20.

The EPA disagrees that there is a statistically discernible downward trend in the NHANES data on blood Hg. The EPA is unaware that a formal statistical analysis for temporal trends has been completed for NHANES data on blood Hg levels for the period 1999 to 2008. Mahaffey*et al.*, evaluating NHANES data collected 1999 to 2004 for women at childbearing age, could "not support the conclusion that there was a general downward trend in blood Hg concentrations over the 6-year study period."[227] However, the same publication noted that "there was a decline in the upper percentiles reflecting the most highly exposed women" having blood Hg concentration greater than established levels of concern. Visual observations of the data show a slight decrease in Hg blood level concentrations from 1999–2008 at the geometric mean, but this decrease may not be statistically significant. The EPA remains concerned that substantial numbers of women of childbearing age in the U.S. may have blood Hg levels that are equivalent to exposures at or above the RfD. While mean and 95th percentiles from recent NHANES data are below the blood Hg concentration equivalent to the RfD, blood levels for some portions of the population (high consumers of fish, for example) show exposures above this level. One study estimated very high blood Hg levels at the 99th percentile for females of child-bearing age.[228] Other published studies have

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[227] Mahaffey, K.R., R.P. Clickner and R.A. Jeffries. 2009. Adult Women's Blood Mercury Concentrations Vary Regionally in the U.S.: Association with Patterns of Fish Consumption (NHANES 1999–2004). *Environ. Health Perspect.*, 117: 47–53.

[228] Tran, N.L., L. Barraj, *et al.*, 2004. "Combining food frequency and survey data to quantify longterm dietary exposure: a methyl mercury case study." *Risk Anal* 24(1): 19–30.

shown that various population groups can have high blood Hg levels.[229] [230] [231] [232] [233] For example, one study found that 83 percent of the NHANES Asian population exceeded the RfD-equivalent blood mercury level.[234]

The EPA disagrees with the commenter regarding confounding by PCBs and lead. Exposure to MeHg in the Faroe Islands was largely from consumption of pilot whale meat; exposure to PCBs was found in the portion of the population who also consume whale blubber. Numerous analyses have shown neurobehavioral effects of PCBs; however, the effects of MeHg and PCB in the Faroe Islands study are separable.[235] The EPA also documented the independence of PCB and MeHg effects in the Faroe Islands population.[236] The National Institute of Environmental Health Sciences (NIEHS) concluded that both PCB and Hg had adverse effects.[237] The NAS concluded

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[229] *Id.*

[230] Miranda, M.L., S. Edwards, *et al.*, 2011. "Mercury levels in an urban pregnant population in Durham County, North Carolina." *Int J Environ Res Public Health* 8(3): 698–712.

[231] Hightower and Moore, 2003.

[232] Hightower, J.M., A. O'Hare, *et al.*, (2006). "Blood mercury reporting in NHANES: identifying Asian, Pacific Islander, Native American, and multiracial groups." Environ Health Perspect 114(2): 173–175.

[233] McKelvey, W., R.C. Gwynn, *et al.*, 2007. "A biomonitoring study of lead, cadmium, and mercury in the blood of New York city adults." Environ Health Perspect 115(10): 1435–1441.

[234] Hightower*et al.*, 2006.

[235] NAS, 2000.

[236] U.S. EPA, 2001a.

[237] National Institute of Environmental Health Sciences (NIEHS). 1998. Scientific issues relevant to assessment of health effects from exposure to methylmercury. Workshop organized by Committee on Environmental and Natural Resources

that there was no empirical evidence or theoretical mechanism to support the opinion that *in utero* Faroese exposure to PCBs exacerbated the reported MeHg effect.[238] A second set of analyses found that the effect of prenatal PCB exposure was reduced when the data were sorted into tertiles by cord PCB concentrations.[239] These analyses support a conclusion that there are measurable effects of MeHg exposure in the Faroese children that are not attributable to PCB toxicity. We also note that there was no report of lead exposure in the Faroe Islands population.

The EPA disagrees with the commenter's assertion that the connection between MeHg in fish and observed health effects is not understood due to evidence from the cited Texas study.[240] This is an exposure study rather than a study on measures of neurobehavioral or any other health endpoint. TCEQ noted that none of the Caddo Lake study participants had blood Hg levels above the benchmark dose level (BMDL) of 5.8 µg/L (one of the several used by EPA in the calculation of the MeHg RfD). The BMDL is not a "no effect" level. Rather it is an effect level for a percentage of the population. The EPA has noted in correspondence with TCEQ that, as an exposure study, the Caddo Lake study may be representative of the surrounding population; however, the sample size is very small. It is not appropriate to extrapolate

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(CENR) Office of Science and Technology Policy (OSTP), The White House, November 18–20, 1998, Raleigh, NC.

[238] NAS, 2000.

[239] Budtz-Jørgensen, E., N. Keiding, and P. Grandjean. 1999. Benchmark modeling of the Faroese methylmercury data. Final Report to U.S. EPA.

[240] DSHA, 2005.

from Caddo Lake to larger regional or national populations.

The EPA is aware of the possibility of both interactions among environmental contaminants and cumulative effects of pollutants that produce the same adverse endpoint. The EPA guidance exists for dealing with such scenarios.[241] [242] [243] [244] The Agency's concern with the likelihood of human exposure to multiple contaminants is reflected in the multi-chemical scope of the rulemaking. However, the EPA focused the technical analyses supporting the proposed regulation on effects of individual pollutants rather than cumulative effects.

The EPA disagrees with commenters suggesting that the RfD-based HQ is inappropriate. The SAB "agreed that EPA's calculation of a hazard quotient

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[241] U.S. EPA. 1986. *Guidelines for the Health Risk Assessment of Chemical Mixtures.* U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC September. EPA/630/R–98/002. Available at *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=2256.*

[242] U.S. EPA. 1999. *Guidance for Performing Aggregate Exposure and Risk Assessments.* U.S. Environmental Protection Agency, Office of Pesticide Programs, Washington, DC October. Available at *http://www.pestlaw.com/x/guide/1999/EPA-19991029A.html.*

[243] U.S. EPA. 2000a. *Supplementary Guidance for Conducting Health Risk Assessment of Chemical Mixtures.* U.S. Environmental Protection Agency, Risk Assessment Forum, Washington, DC EPA/630/R–00/002. Available at *http://www.epa.gov/ncea/raf/pdfs/chem_mix/chem_mix_08_2001.pdf.*

[244] U.S. EPA. 2003a. Framework for Cumulative Risk Assessment. Risk Assessment Forum, U.S. Environmental Protection Agency. Washington, DC EPA/630/P–02/001F. EPA/600/P–02/001F. Available at *http://cfpub.epa.gov/ncea/ cfm/ recordisplay.cfm?deid=54944.*

for each watershed included in the assessment is appropriate as the primary means of expressing risk," and that "because the RfD from which the HQ is calculated is an integrative metric of neurodevelopmental effects of methylmercury, it constitutes a reasonable basis for assessing risk."[245]

The SAB also recommended that EPA revise the Hg Risk TSD to include additional qualitative discussion about uncertainty in the revised Hg Risk TSD. Specifically, the SAB recommended that EPA revise the Hg Risk TSD "to better explain the methods and choices made in the analysis, and analytical results, and where the uncertainties lie." The SAB noted several uncertainties related to the RfD. The EPA agrees with this recommendation and included a more complete discussion of these uncertainties in the revised Hg Risk TSD.

The EPA disagrees that the IQ metric threshold is questionable. The SAB concluded that it was reasonable to consider a loss of >1 or >2 IQ points a public health concern. The SAB stated, "The Panel agreed that if IQ loss is retained in the risk assessment despite these reservations, a loss of one or two points would be an appropriate benchmark."[246] The SAB further comments in their report: "The consensus is that if IQ were to be used, then a loss of 1 or 2 points as a population average is a credible decrement to use for this risk assessment. This metric seems to be derived from the lead literature and was peer reviewed by the Clean Air Scientific Advisory Commit-

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[245] U.S. EPA–SAB, 2011.

[246] U.S. EPA–SAB, 2011.

tee (U.S. EPA CASAC 2007).[247] Although its applicability to methylmercury is questionable, the size of the decrement is justified based on the extensive analyses available from the literature reviewed by CASAC."[248] As noted in other studies,[249] [250] a decrease of 1–2 points at the mean results in a much larger decrease in those with IQs that are much lower or higher than the mean.

Although EPA disagrees that the IQ results are too uncertain to rely upon, the EPA acknowledges that IQ is not the most sensitive neurodevelopmental endpoint affected by MeHg exposure, as also noted by the SAB. The SAB recommended that the IQ analyses be retained but be de-emphasized in the documentation underlying the final regulation. The SAB concluded, "The Panel does not consider it appropriate to use IQ loss in the risk assessment and recommended that this aspect of the analysis be de-emphasized, moving it to an appendix where IQ loss

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[247] U.S. Environmental Protection Agency—Science Advisory Board (U.S. EPA–SAB). 2007. *Clean Air Scientific Advisory Committee's (CASAC) Review of the 1st Draft Lead Staff Paper and Draft Lead Exposure and Risk Assessments.* EPA–CASAC–07–003. March. Available on the internet at *http://yosemite.epa.gov/sab/sabproduct.nsf/989B57DCD436111B852572AC0079DA8A/$File/casac-07-003.pdf.*

[248] U.S. EPA–SAB, 2011.

[249] Axelrad, D. A.; Bellinger, D. C.; Ryan, L. M.; Woodruff, T. J. 2007. "Dose-response relationship of prenatal mercury exposure and IQ: An integrative analysis of epidemiologic data." *Environmental Health Perspectives,* 115, 609–615.

[250] Bellinger DC. 2005. *Neurobehavioral Assessments Conducted in the New Zealand, Faroe Islands, and Seychelles Islands Studies of Methylmercury Neurotoxicity in Children.* Report to the U.S. Environmental Protection Agency. EPA–HQ–OAR–2002–0056–6045.

is discussed along with other possible endpoints not included in the primary assessment. While the Panel agreed that the concentration-response function for IQ loss used in the risk assessment is appropriate, and no better alternatives are available, IQ loss is not a sensitive response to methylmercury and its use likely underestimates the impact of reducing methylmercury in water bodies."[251] The EPA is following the SAB's recommendation by deemphasizing the IQ analysis and placing that analysis in an appendix to the revised Hg Risk TSD.

The SAB, however, supported the use of the IQ dose-response function calculated by EPA in the Hg Risk TSD. The SAB noted, "The function used came from a paper by Axelrad and Bellinger (2007) that seeks to define a relationship between methylmercury exposure and IQ. A whitepaper by Bellinger (Bellinger, 2005)[252] describes the sequence of steps in relating methylmercury exposure to maternal hair mercury and then that to IQ. The Mercury Risk TSD furthers notes that IQ has shown utility in describing the health effects of other neurotoxicants. These are appropriate bases for examining a potential impact of reducing methylmercury on IQ, but the SAB does not consider these compelling reasons for using IQ as a primary driver of the risk assessment."[253]

The EPA disagrees that the Agency has overstated or failed to review the scientific literature on cardiovascular effects from MeHg exposure. As summarized in the preamble to the proposal, the EPA stated that the NAS study concluded that "Although the da-

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[251] U.S. EPA–SAB, 2011.
[252] Bellinger, 2005.
[253] U.S. EPA–SAB, 2011.

ta base is not as extensive for cardiovascular effects as it is for other end points (*i.e.*, neurologic effects) the cardiovascular system appears to be a target for MeHg toxicity in humans and animals."[254] The EPA also stated that additional cardiovascular studies have been published since 2000. The EPA did not develop a quantitative dose response assessment for cardiovascular effects associated with MeHg exposures, as there is no consensus among scientists on the dose-response functions for these effects, and there is inconsistency among available studies as to the association between MeHg exposure and various cardiovascular system effects. In the future, the EPA may update the MeHg RfD and will review all of the relevant scientific literature available at that time, including data on all relevant endpoints, and weight of evidence for likelihood that MeHg produces specific effects in humans.

The EPA acknowledges the research regarding the effectiveness of fish advisories. However, the proposed regulation does not address the subject of fish advisories, consumer advice on fish or efficacy of such advice. The EPA rejects the commenter's speculation regarding whether the estimated IQ impacts for the regulation are real. Adverse effects of *in utero* Hg exposure have been reported in populations in the U.S.[255] [256] In another study on neurobehavioral effects of prenatal exposure to MeHg through maternal consumption of seafood, adverse effects are observed for MeHg even without controlling for fish consump-

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[254] 76 FR 25001.

[255] Oken *et al.*, 2008.

[256] Lederman *et al.*, 2008.

tion.[257] That study suggests that at normal Japanese dietary intake of MeHg and fish nutrients, the overall effect is adverse. While Japanese fish consumption and Hg exposure are both somewhat higher than the mean U.S. exposure, these levels are still within the distribution of U.S. consumers.

Moreover, many studies show that beneficial effects of fish on both cardiovascular and neurodevelopmental health are decreased by concomitant exposure to MeHg. Several studies describe one or more aspects of exposure to fish nutrients and MeHg.[258] [259] [260] [261] [262] [263] [264] Recent studies[265] [266] [267] and analyses indi-

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[257] Suzuki, K., Nakai, K., Sugawara, T., Nakamura, T., Ohba, T., Shimada, M., Hosokawa, T., Okamura, K., Sakai, T., Kurokawa, N., Murata, K., Satoh, C., and Satoh, H. 2007. "Neurobehavioral effects of prenatal exposure to methylmercury and PCBs, and seafood intake: neonatal behavioral assessment scale results of Tohoku study of child development." *Environ Res* 110, 699–704.

[258] Grandjean P, Bjereve K, Wihe P, and Sterewald u. 2001a. "UBirthweight in a fishing community: significance of essential fatty acids and marine food contaminants." *In. J. Epidemiol.* 30:1272–1278.

[259] Budtz-Jorgensen, E.; Grandjean, P.; Weihe, P. 2007. "Separation of risks and benefits of 16 seafood intake." *Environmental Health Perspectives.* Vol. 115, 323–327.

[260] Choi *et al.*, 2008a.

[261] Choi *et al.*, 2008b.

[262] Oken *et al.*, 2008.

[263] Strain, J.J. *et al.*, 2008. Associations of maternal long chain polyunsaturated fatty acids, methyl mercury, and infant development in the Seychelles Child Development Nutrition Study." *Neurotoxicology.* 29(5): 776–782.

[264] Suzuki, *et al.*, 2007.

[265] Oken *et al.*, 2008.

[266] Choi AL, Cordier S, Weihe P, Grandjean P. 2008a. "Negative confounding in the evaluation of toxicity: the case of

cate the potential for nutrients in fish (particularly marine fish) to mask some of the observed adverse effects of MeHg. Because EPA did not adjust for potential confounding by nutrients in marine fish and mammals, the benchmark doses used in the RfD derivation may be underestimated.

The EPA recognizes the potential for confounding of the effects of Hg on the developing nervous system by a range of nutrients and discusses this uncertainty in the revised Hg Risk TSD. Regarding selenium, the SAB commented that "one SAB member suggests the use of blood markers of selenium-dependent enzyme function, noting that methylmercury irreversibly inhibits selenium-dependent enzymes that are required to support vital-but-vulnerable metabolic pathways in the brain and endocrine system. Impaired selenoenzyme activities would be observed in the blood before they would be observed in brain, but the effect is also expected to be transitory. The use of these measures is a minority view among the SAB members."[268] The SAB did not express a consensus recommendation on adjustments to the risk estimates for exposure to selenium or other nutrients, noting that "there is not enough known about their quantitative impact to support a recommendation of a re-analysis."[269]

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methylmercury in fish and seafood." *Crit Rev Toxicol.* 2008;38(10):877–93.

[267] Choi AL, Budtz-Jørgensen E, Jørgensen PJ, Steuerwald U, Debes F, Weihe P, Grandjean P. 2008b. "Selenium as a potential protective factor against mercury developmental neurotoxicity." *Environ Res.* May;107(1):45–52. Epub 2007 Sep 12.

[268] U.S. EPA–SAB, 2011.

[269] *Id.*

6. General Comments on Hg Risk Assessment

Comment: Several commenters generally supported the Hg risk assessment, but several other commenters generally disagreed with the Hg risk assessment. One supporter stated that EPA reasonably determined that Hg emissions pose a public health hazard, correctly requested peer review of Hg risk analysis and correctly concluded EGU-attributable MeHg poses a hazard to public health at watersheds when considering all sources of Hg deposition and U.S. EGUs alone. Two commenters noted that the contribution of U.S. EGUs to total Hg deposition can significantly contribute to hundreds of watersheds, and U.S. EGU deposition alone may endanger sensitive populations near many of these watersheds.

Several commenters claimed that overly conservative assumptions in the risk analysis render the results flawed and unreliable, including using CMAQ to model deposition, Mercury Maps, fish consumption rate and fish MeHg concentrations, overly stringent RFD, national-scale model, using poverty as a surrogate for subsistence fishing, assuming a subsistence fisher resides in most watersheds with fish tissue data, fishers only eat larger fish with high Hg concentrations, cooking loss adjustment, unrealistically high fish ingestion rates (a large fish meal every day), focused on the extremes of the distributions, cast many assumptions as an underestimate of the effect despite evidence to the contrary, and created inappropriate metrics for risk that show no improvement despite significant Hg emissions reductions in the U.S.

Several commenters cite Tetra Tech's analysis that assessed Hg risk using different consumption rates, cooking factor, mean fish tissue concentrations, and

EGU-attributable Hg deposition only, which showed considerably fewer watersheds that exceed an HQ of 1 at 2016 deposition levels.

Several commenters claim that this regulation would not significantly reduce Hg exposure via fish consumption because EGU-attributable deposition is a small fraction of total deposition. One commenter stated that EPA's data shows Hg emissions from U.S. EGUs have little influence on fish Hg concentrations despite a reduction of 41 tons of Hg in the U.S. between 2005 and 2016. One commenter requested that EPA accurately describe the low health risks posed by utility hazardous air pollutant emissions. One commenter stated that EPA did not consider scientific information showing that there is no straightforward connection between Hg emissions from U.S. EGUs to the Hg level in fish, which is dependent upon many environmental factors, such as sunlight and organic matter, pH, water temperature, sulfate, bacteria, and zooplankton present in the ecosystem. One commenter stated that there is not any demonstrable evidence that anyone in the U.S. has suffered adverse health problems as a result of Hg emissions from coal-fired EGUs. One commenter stated that EPA's findings are similar to the 2000 findings where EPA found a plausible link between anthropogenic emissions of Hg from sources in the U.S. and MeHg in fish, and "plausible" is a euphemism for unproven.

Several commenters had recommendations for the Hg risk analysis. One commenter stated that more data from Florida should have been included because Florida is known to have a rich data set on fish Hg concentrations. One commenter stated that EPA should characterize general recreational angler fish-

ers instead of subsistence fishers. One commenter claims that EPA made math errors in the Hg Risk TSD regarding the deposition in watersheds at specific percentiles. One commenter questioned EPA's policy metrics used to characterize Hg risk.

Several commenters stated that the Hg TSD is unclear and lacks detail, as noted by the SAB. One commenter stated that the SAB is critical of EPA's efforts, stating that the SAB found it difficult to evaluate the risk assessment based solely upon Hg Risk TSD and recommended that EPA transparently explain the methods and uncertainties. One commenter stated that because of insufficient review time and the lack of detail in the Hg Risk TSD, they could not assess key questions, such as the nation-wide representativeness of the fish tissue data.

One commenter stated the subset of watersheds considered in the analysis (*i.e.*, with fish tissue data) have clearly higher U.S. EGU-attributable deposition than the distribution of all watersheds.

One commenter stated EPA's reporting of IQ point loss is erroneous and not relevant to informing policy, and the U.S. EGU contribution to risk is marginal as evidenced by the null values for the 50th percentile watershed.

One commenter notes that U.S. EGU-attributable emissions of Hg have decreased significantly between 2005 and 2016, but claims that this decrease does not appear to affect the risk results.

Response: The purpose of the Hg risk assessment is not to assess the magnitude of risk reduction under the proposed rule, but rather to estimate the magnitude of absolute risk attributable to U.S. EGUs cur-

rently and following implementation of other applicable CAA requirements. That said, any potential risk reductions following implementation of the MACT rule itself would likely reflect a number of factors besides the national average U.S. EGU deposition value cited by the commenter. These additional factors include: (a) Spatial gradients in the magnitude of absolute U.S. EGU-attributable Hg deposition, (b) spatial gradients in the magnitude of reductions in Hg deposition linked to the rule, (c) availability of measured fish tissue Hg levels in the vicinity of U.S. EGUs experiencing larger Hg emission reductions to support risk modeling, and (d) the potential for subsistence fishing activity at watersheds in the vicinity of U.S. EGUs experiencing larger reductions in Hg emissions (also required to support risk modeling). It is also important to point out that while the national average U.S. EGU-attributable Hg deposition (for the 2016 scenario—see revised Hg Risk TSD) is two percent, values range up to 11 percent for the 99th percentile watershed. This illustrates the substantial spatial variation in U.S. EGU-attributable Hg deposition, which translates into spatial variation in the magnitude of U.S. EGU-attributable subsistence fisher risk.

The SAB conducted a comprehensive peer review of all of EPA's assumptions in the Hg Risk TSD, and concluded that "the SAB supports the overall design of and approach to the risk assessment and finds that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from Hg emitted from U.S. EGUs."[270] Furthermore, the SAB concluded, "The SAB regards the

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[270] U.S. EPA–SAB, 2011.

design of the risk assessment as suitable for its intended purpose, to inform decision-making regarding an "appropriate and necessary finding" for regulation of hazardous air pollutants from coal and oil-fired EGUs, provided that our recommendations are fully considered in the revision of the assessment."[271] Although the SAB did indicate difficulty in evaluating the risk assessment based solely on the Hg Risk TSD, the panel obtained additional information from EPA through the peer review process and determined that "the SAB supports the overall design of and approach to the risk assessment and finds that it should provide an objective, reasonable, and credible determination of the potential for a public health hazard from mercury emitted from U.S. EGUs."[272] The primary advice of the SAB panel was that EPA should "revise the Technical Support Document to better explain the methods and choices made in the analysis, and analytical results, and where the uncertainties lie."[273] The EPA has revised the Hg Risk TSD as part of the final rulemaking to address the SAB's recommendations and has made that revised Hg Risk TSD available in the rule docket.

The SAB concurred with EPA's analytical assumptions and overall study design for the Hg Risk TSD, including the RfD-based HQ approach, fish tissue data, 75th percentile size fish, Mercury Maps assumption, and consumption rates. Based on the SAB peer review, the EPA strongly disagrees with commenter statements that the results reported in the Hg Risk TSD are unreliable, overly conservative, extreme, in-

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[271] *Id.*
[272] *Id.*
[273] *Id.*

consistent with EPA risk guidelines, or severely overstate risk based on the stated objectives of the analysis. The EPA has specifically addressed each of these assumptions in the previous sections of the preamble, and thus, does not repeat those responses here. Based on the review by the SAB, the EPA has accurately described the health risks posed by utility hazardous air pollutant emissions and disagrees with the commenter's statement that EPA has not provided any demonstrable evidence to show that adverse health risks exist. The EPA has applied peer reviewed modeling to estimate the deposition of Hg attributable to U.S. EGUs. The EPA asserts that these metrics demonstrate a clear hazard to public health from Hg emissions from U.S. EGUs.

The EPA thoroughly evaluated the Tetra Tech analysis. The EPA does not agree that the analysis by Tetra Tech uses assumptions that are "more reasonable", and the SAB agreed that all of EPA's assumptions in the Hg Risk TSD are reasonable and appropriate. The EPA asserts that Tetra Tech's analysis does not fully cover subsistence fishers likely to experience elevated U.S. EGU-related Hg exposure. Specifically, the risk estimate cited in the comment reflects application of a number of behavioral assumptions that provide significantly less coverage for higher risk subsistence fishers. Fish consumption surveys cited in the revised Hg Risk TSD suggest that higher percentile subsistence fishers eat more than twice the level of fish assumed by Tetra Tech. Tetra Tech's analysis also used the median fish tissue levels, but it is reasonable to assume that subsistence fishers would target somewhat larger fish to maximize the volume of edible meat per unit time spent fishing. Tetra Tech's analysis also as-

sumed that cooking fish did not concentrate Hg, but a number of studies discussed in the revised Hg Risk TSD explicitly provide adjustment factors involving a higher unit concentration following preparation. Taken together, Tetra Tech's analysis does not address the stated goal of the risk assessment to assess the nature and magnitude of risk for those individuals likely to experience the greatest risk associated with exposure to U.S. EGU-attributable Hg.

The EPA disagrees with the commenter's assertion that this rule will not affect risks associated with Hg exposure. Hg from U.S. EGUs contributes to the levels of MeHg in fish across the country and consumption of contaminated fish can lead to increased risk of adverse health effects. The EPA has shown in the RIA (Chapter 5) that this rule will reduce Hg levels in fish.

The EPA acknowledges that U.S. EGUs contribute only a small fraction of total Hg deposition in the U.S. However, U.S. EGUs remain the largest emitter of Hg in the U.S., and the revised Hg Risk TSD shows that U.S. EGU-attributable Hg deposition results in up to 29 percent of modeled watersheds with populations potentially at-risk. Our analyses show that of the 29 percent of watersheds with population at-risk, in 10 percent of those watersheds U.S. EGU deposition alone leads to potential exposures that exceed the MeHg RfD, and in 24 percent of those watersheds, total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition. Mercury risk is increasing for exposures above the RfD, and as a result, any reductions in Hg exposures in locations where total exposures exceed the RfD can result in reduced risks. While

these reductions in risk may be small for most populations and locations, in some watersheds and for some populations, reductions in risk may be greater.

The SAB also directly addressed the question of the nation-wide representativeness of the fish tissue MeHg data in the national Hg risk assessment. The SAB concluded, "Although the SAB considers the number of watersheds included in the assessment adequate, some watersheds in areas with relatively high mercury deposition from U.S. EGUs were undersampled due to lack of fish tissue methy[l]mercury data. The SAB encourages the Agency to contact states with these watersheds to determine if additional fish tissue methylmercury data are available to improve coverage of the assessment."[274] In response to the SAB's recommendations, the EPA obtained additional fish tissue sample data from several states, particularly Pennsylvania, Wisconsin, Minnesota, New Jersey, and Michigan. This additional data increased the total number of watersheds assessed in the analysis by 33 percent nationally. In Florida, the EPA assessed the Hg-related health risk for 40 watersheds. Because EPA did not find any additional fish tissue data for watersheds in Florida that could be incorporated into the analysis, the total number of watersheds in Florida assessed in the revised Hg Risk TSD remains the same as the Hg Risk TSD at proposal.

The EPA disagrees with the commenter that there were errors in the Hg Risk TSD. Instead, the commenter has misinterpreted how EPA calculated the percentiles. The percentile (and mean) values pre-

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[274] U.S. EPA–SAB, 2011.

sented in Table ES–1 for total and U.S. EGU-attributable Hg deposition are not matched by watershed. In other words, the EPA queried for the percentiles (and mean) provided for total Hg deposition and presented those percentiles and then separately estimated the percentiles for U.S. EGU-attributable Hg. Therefore, the total and U.S. EGU-attributable values for the 99th percentile do not necessarily occur at the same watershed. The EPA has provided additional clarification in the revised Hg Risk TSD.

The EPA agrees with the commenter that MeHg levels in fish depend on a complicated set of environmental factors, and EPA acknowledged this in the revised Hg Risk TSD. Furthermore, the EPA acknowledges that total Hg fish tissue levels are not correlated with levels of total Hg deposition when looking across watersheds because this relationship is highly dependent on the methylation potential at the specific waterbody, which is affected by pH, sulfate deposition, turbidity, etc. However, several recent studies[275] [276] [277] show, and the SAB agrees, that it is appropriate for EPA to assume that changes in Hg deposition are linearly associated with *changes* in fish tissue concentration. In addition, the EPA agrees that the subset of watersheds in the risk analysis have somewhat higher U.S. EGU deposition than the distribution of all watersheds, but EPA disagrees that oversampling of high deposition watersheds is inappropriate.

The EPA does not agree that there is no improvement in fish Hg concentrations between 2005 and

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[275] Orihel *et al.*, 2007.

[276] Orihel *et al.*, 2008.

[277] Harris *et al.*, 2007.

2016, or that there will be no further improvement from decreasing Hg emissions from U.S. EGUs from the baseline in 2016. Although total risk from all Hg exposures will remain elevated in much of the U.S., much of that risk is associated with global, non-U.S. Hg emissions. U.S. EGUs remain the largest source of Hg emissions in the U.S., and reductions in those emissions will result in reduced Hg deposition in many highly impacted watersheds. As shown in the revised Hg Risk TSD, average U.S. EGU-attributable fish tissue Hg concentrations is estimated to decrease by 44 percent between 2005 and 2016. Although we did not remodel risk for the 2005 scenario in the revised Hg Risk TSD, we estimated at proposal that the total percent of modeled watersheds with populations potentially at-risk from Hg emissions from U.S. EGUs exceeding either risk metric (*i.e.*, U.S. EGUs alone or total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent) would decline from 62 percent in 2005 to 28 percent in 2016. This projected decline is primarily due to a combination of additional pollution control technologies installed to comply with federal regulations, such as CSAPR, and changing fuels, such as the shift to natural gas.

The EPA disagrees that IQ loss is erroneous or irrelevant to informing policy, but EPA has moved that analysis to an appendix in the revised Hg Risk TSD, per the SAB's recommendation. The EPA disagrees that the IQ effects at the 50th percentile watershed are useful in determining that there is not a hazard to public health because EPA's stated goal of the risk assessment was to focus on populations likely to experience relatively higher exposures to U.S. EGU-attributable Hg.

We also disagree with those commenters that point to the SAB's statements concerning the clarity of the Hg Risk TSD to suggest that the public did not have an ample opportunity to comment on the Hg risk assessment. Although it is correct that the SAB said the Hg Risk TSD was difficult to evaluate until EPA staff explained it at the public meeting in June 2011, we note that the commenters that assert that this issue amounts to a violation of CAA section 307(d) notice requirements made detailed technical comments, including many of the same comments as the SAB. Furthermore, the EPA provided notice of the peer review in the preamble to the proposed rule and a number of **Federal Register** notices advised the public of the peer review process and all the meetings were open to the public for comment and participation and the minutes of those meetings were posted on the SAB Web site. The minutes for the June 2011 meeting, during which EPA provided clarifying information, were available well within the public comment period for the proposed rule. For these reasons, we maintain that the public was provided an adequate opportunity to comment on the Hg risk assessment.

e. Non-Hg HAP Case Studies

1. Emissions for Non-Hg Case Studies

Comment: The commenters raised concerns about a wide variety of aspects of EPA's approach for emissions used for the non-Hg case studies, including the use of an arithmetic mean for computing emission factors for representing emissions of untested units, the suggestion of statistical outliers in the Cr test data, the claim that metals content of the fuel is an indicator of flawed test data, the statistical approaches

used by EPA to create emission factors, the absence in EPA's approach of an equation that commenters claim better represents emissions values, that EPA's approach to estimate Cr(VI) is flawed, and the lack of coal rank as a delineating factor for emission factor calculation. The commenters also suggested that EPA should revise stack parameters used for the case studies based on better available data.

Response: In response to the comments on the emission factors, the EPA has undertaken additional analysis to address all commenter concerns. The EPA disagrees with commenter's criticisms of emission factors based on arithmetic means, and EPA demonstrates that the use of an arithmetic mean provides the most representative result. The EPA analysis has found that the geometric mean approach recommended by the commenter always under predicts actual emissions by an average of more than seventy percent. The EPA agrees with commenters' recommendations to use statistical outlier tests, but has applied tests different from those suggested by the commenters. As further explained in the response to comments document in the docket, this approach did not eliminate the Cr test data from the Cr emission factors used for some of the case study emissions.

The EPA disagrees with commenters' assertions that the metal content of the coal is a basis for invalidating the test results of high Cr emissions. The identification of sources whose measured emissions do not match the commenters' preconceived idea of emissions behavior is not surprising. There are many possible explanations for these differences. For example, the inconsistency between the test data and

the coal analysis could be due to any number of reasons including unrepresentative coal sampling, control device problems, degradation of the refractory, or sampling contamination. The idea that test data should be discarded because it does not match initial expectations is unfounded.

The EPA disagrees with the commenter recommendations for using an equation from AP–42, developed in part by the commenters. Based on analyses of metal emissions measured at the site compared to statistically predicted estimates, the EPA concluded that measured emissions test data better predict actual emissions, and emission factors based on the arithmetic mean are a reasonable method to estimate emissions when test data are not available. The EPA analysis of the ICR data has found that the emissions equation recommended by the commenter is not a good predictor of actual EGU emissions. The EPA also disagrees with commenters' concerns about the assumption that 12 percent of the Cr will be Cr(VI) for every coal-fired unit, which was specifically supported by the peer review on the approach for estimating cancer risks associated with Cr and Ni emissions. The EPA disagrees with the commenter's assertion that any impact of scrubbers will impact the case study analyses. In EPA's revised case study analysis, 6 facilities have risk greater than 1 in a million, and of these, four facilities have Cr as the risk driver (James River, Conesville, TVA Gallatin, and Dominion—Chesapeake Bay). For these facilities, none of the units contributing the bulk of the Cr emissions have scrubbers according to the data provided to EPA by those facilities, so scrubber impacts on Cr speciation is not relevant to EPA's conclusions based on the non-Hg case studies. In any case, the

EPA disagrees with the commenter's conclusions about the impacts of scrubbers on Cr speciation and provides evidence that impacts of scrubbers on Cr speciation can have the opposite effect on Cr(VI) fractions, concluding that EPA's 12 percent assumption is somewhat conservative.

The EPA also disagrees that coal rank must be a factor in computing Cr emission factors for use in the case studies. The EPA's analysis has demonstrated that coal rank appears to play no role in non-Hg metals emissions. The EPA's newly revised emissions factor development procedures can isolate and compare subgroups based on control device type or coal rank; the ICR data were subjected to these tests and no statistical significance was found between coal rank groups.

Finally, the EPA agrees with one commenter's recommendations on revised stack parameters for the case studies and has included these revisions in the case study modeling for the final rule.

2. General Comments on Non-Hg Risk Case Study

Comment: One commenter stated that EPA's case study assessment reaffirms the need to regulate HAP emitted by both coal and oil-fired EGUs. The commenter noted that over 40 percent of the case studies conducted by EPA to quantify health hazards associated with the inhalation of non-Hg HAP indicated a cancer risk greater than or equal to the one in a million threshold level required to delist a source category under CAA section 112.

One commenter stated that EPA's case study assessment might be flawed by the use of "beta" tests

versions of the AERMOD meteorological preprocessors (AERMINUTE and AERMET). The commenter obtained from EPA the meteorological data used for EPA's assessment of the Conesville facility and processed these data with EPA's current regulatory versions of these preprocessors, which differ from the beta version. According to the commenter, a comparison of the hourly wind speed and hourly wind direction data produced by the beta preprocessor and by current EPA preprocessors revealed numerous and often substantial disparities.

One commenter stated that EPA's finding that only three coal-fired facilities and one oil-fired facility out of roughly 440 coal-fired facilities and 97 oil-fired facilities in the U.S. indicated risk greater than one-in-a-million supports a finding that it is "appropriate" to regulate those four and not the other 537. Another commenter stated that EPA found only a "few" facilities that have estimated maximum cancer risks in excess of one in a million, and that this does not justify regulating all non-Hg HAP for all sources in this category.

One commenter stated that EPA's discussion in the preamble to the proposed rule misleads the reader into believing that non-Hg HAP emissions from EGUs are associated with serious human health effects. According to the commenter, the EPA's discussion of the effects associated with excessive exposure to an individual HAP would lead the reader to believe that those effects inevitably occur from EGU emissions because EGU emissions have trace amounts of non-Hg HAP.

One commenter stated that with the assumptions in the Utility Study, both in terms of conservative

scientific estimates and overestimated amounts of oil burned by these units, the EPA concluded that the risks from oil-fired units would result in only one new cancer case every 5 years. The commenter does not believe that this level of risk warrants regulation under CAA section 112(n)(1)(A).

Several commenters stated that even if the additional studies EPA performed were accurate, they hardly demonstrate that it is necessary and appropriate to regulate coal-fired EGU HAP under CAA section 112 because three sites nationwide show risks greater than one in a million, with the highest at eight in a million.

One commenter stated that the highest cancer risk estimated for coal-fired EGUs is still within the acceptable range used by EPA in other programs and is also far less than the background exposure risks the average person experiences. The background risk of developing cancer in a lifetime is approximately one in three (0.33). According to EPA's own data, the predicted added cancer risk of exposure to HAP from U.S. EGUs would change the background risk from 0.33 to 0.330001. This level of change is so minimal that it could not be observed in any health effects study that might be conducted.

One commenter stated that EPA conducted a health risk assessment on a limited number of facilities and found a "few" facilities that have estimated maximum cancer risks in excess of one in a million. The commenter stated that, based on this limited health risk assessment, the EPA apparently decided that they were justified to regulate all non-Hg HAP for all sources in this category.

Several commenters stated that EPA's assumption implies that a person stays exactly at the center of a census tract for 70 years and that a unit will operate in exactly the same manner for 70 years is unrealistic. The commenters suggest that Tier 3 risk assessment is warranted or a lifetime exposure adjustment is needed.

One commenter asserts that because the alleged health benefits are derived from total exposure, the EPA should explain how its numerical emission limit units, which would not directly restrict total exposure if heat inputs increase, redress this health concern. In its preamble, the EPA simply notes that its emission limit units are consistent with, and allow for simple comparison to, other regulations.

One commenter questioned whether acid gas emissions limits for oil-fired units are "appropriate" or "necessary" because EPA's new technical analyses do not indicate a health concern from acid gas emissions from oil-fired units. According to the commenter, the EPA identifies Ni as the main HAP of concern from oil-fired units, even though cancer-related inhalation risks were well below the RfCs and EPA states that significant uncertainty remains as to whether those emissions present a health concern.

Response: The EPA agrees with the commenter that the non-Hg HAP risk assessment confirms the appropriate and necessary finding.

The EPA disagrees that EPA's case study assessment is flawed by the use of beta versions of AERMINUTE and AERMET. The EPA remodeled the case study facilities using the current versions of AERMINUTE (version 11059), AERMET (version

11059), and AERMOD (version 11103). Although there were differences in the number of calm and missing winds in the current AERMINUTE/AERMET output compared to the beta version, the resulting risks differed by less than two percent, on average. For Conesville, which had the largest difference in calms between the beta and current versions of AERMINUTE/AERMET, the risks differed by three percent. For the final rule, the case study facilities have been modeled with the current available versions of AERMINUTE, AERMET, and AERMOD.

The EPA disagrees with the commenter that having only a few case study facilities exceeding one in a million risk invalidates the "appropriate finding". The 16 facilities EPA selected as case studies for assessment may not represent the highest-emitting or highest-risk sources. Although case study facility selection criteria included high estimated cancer and non-cancer risks using the 2005 NEI data, high throughput, and minimal emission control, another necessary criterion was the availability of Information Collection Request (ICR) data for the EGUs at those facilities (or for similar EGUs at other facilities). Because the ICR data were collected for the purpose of developing the MACT standards, the ICR was targeted towards better performing sources for non-Hg metal HAP, acid gas HAP, and organic HAP, with a smaller set of random recipients. Therefore, facilities for which ICR data were available may not represent the highest-emitting sources. The EPA's assessment of the case study facilities for the proposed rule concluded that three coal-fired facilities and one oil-fired facility had estimated lifetime cancer risks greater than one in a million. For the final

rule, revisions were made to the 16 case studies based on comments received, and the results indicate that 5 coal-fired facilities and 1 oil-fired facility had estimated lifetime cancer risks greater than 1 in a million. The EPA maintains that its finding that more than 30 percent of the case study facilities had a cancer risk greater than one in a million is sufficient to support the appropriate finding.

The EPA disagrees with the commenter's assertion that the health effects associated with exposures to non-Hg HAP from U.S. EGUs are mischaracterized in the preamble to the proposed rule. The discussion of the health effects of non-Hg HAP provided in the preamble includes general information on the potential health effects associated with a broad range of exposure concentrations (from low to high levels) of the various non-Hg HAP (some of which have been determined to be carcinogenic to humans) based on peer reviewed scientific information extracted from priority sources such as IRIS, Cal EPA and ATSDR health effects assessments.

The EPA disagrees with the commenter's characterization of the Utility Study. The Utility Study represented the highest-quality factual record of information available at the time regarding EGU emissions and risks. Further, the EPA's revised risk assessments of 16 case studies, performed with more recent data and refined scientific methods, indicate that there are six U.S. EGU facilities that pose estimated inhalation cancer risks greater than 1 in a million. The EPA maintains that the findings of the case studies are one element that independently supports our determination that it remains appropriate and necessary to regulate EGUs under CAA section 112.

The EPA does not agree with the commenter who suggested that EPA should interpret the results of the non-Hg HAP risk analysis in the context of background cancer risk. As explained in the preamble to the proposed rule, the EPA reasonably looked to the cancer risk threshold established under CAA section 112(c)(9)(B)(1) for delisting a source category as an indicator of the level of cancer risk that was appropriate to regulate under CAA section 112. The commenters comparison of the cancer risk from EGUs as compared with the risk of contracting cancer from unknown sources is not the standard Congress established for evaluating HAP emission risk and the commenter has provided no support for its contention that the Agency should evaluate risk in that manner. The EPA maintains that the analysis was reasonable.

The EPA does not agree with the commenter's implication that EPA must make a facility-specific finding for each HAP for each source and then only regulate individual EGU facilities for the individual HAP that identified as causing an identified hazard to public health or the environment. That approach is not required under CAA section 112(n)(1) or anywhere under CAA section 112, and it would be virtually impossible to undertake such an effort. For these reasons, the EPA does not agree with the commenter and maintains that the appropriate and necessary finding is reasonably supported by the record and consistent with the statute for all the reasons set forth in the preamble to the proposed rule and this final action.

The EPA disagrees that an exposure adjustment is needed to account for conditions changing over 70 years because it runs counter to the longstanding ap-

proach that EPA has taken to estimate the maximum individual risk, or MIR. The MIR is defined by EPA's Benzene NESHAP regulation of 1989[278] and codified by CAA section 112(f) as the lifetime risk for a person located at the site of maximum exposure 24 hours a day, 365 days a year for 70 years (*e.g.*, census block centroids). The MIR is the metric associated with the determination of whether or not a source category may be delisted from regulatory consideration under CAA section 112(c)(9). The MIR is the risk metric used to characterize the inhalation cancer risks associated with the case study facilities. The EPA used the annual average ambient air concentration of each HAP at each census block centroid as a surrogate for the lifetime inhalation exposure concentration of all the people who reside in the census block. The EPA has used this approach to estimate MIR values in all of its risk assessments to support risk-based rulemakings under CAA section 112 to date.

The EPA disagrees with the commenter's assertion that the numerical emission limits being promulgated in today's final rule must be justified on their ability to redress the health concerns that were identified as the basis for regulating EGUs. The emission limits in today's rule are technology-based, as prescribed under CAA section 112, and do not need to be justified based on their ability to protect public health. Regarding potential health concerns, the EPA has up to 8 years after the promulgation of the technology-based emission limits for EGUs to determine whether the regulations protect public health with an ample margin of safety. If the regulations do not, the CAA directs EPA to promulgate additional more stringent

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[278] 54 FR 38044.

standards (within the prescribed 8 years) to achieve the appropriate level of public health protection.

Furthermore, the EPA reasonably concluded that it was appropriate and necessary to regulate oil-fired EGUs in 2000, and EPA confirmed that conclusion was proper with the analysis set forth in the preamble to the proposed rule. Certain commenters question the determination based on their views of how the Agency can and should exercise its discretion. The EPA disagrees with these commenters and stands by the determination for the reasons set forth in the preamble to the proposed rule. The EPA also stands by the determination that the maximum cancer risks posed by emissions of oil-fired EGUs are greater than one in a million, due primarily to emissions of Ni compounds. Based on our analysis, we are unable to delist oil-fired EGUs.

3. Ni Risk

Comment: Several commenters stated that the assumptions regarding the speciation and carcinogenic potential of Ni compounds used in EPA's inhalation risk assessment of the case study facilities are overly conservative and likely to overstate the risks. With respect to Ni speciation, the commenters stated that there are substantial uncertainties regarding the species of Ni being emitted and the risk of such emissions, and that EPA has made ultraconservative assumptions aimed at overestimating the risk. The commenters stated that assigning the same carcinogenic potency of Ni subsulfide to other forms of Ni is overly conservative and inconsistent with the best available evidence.

Response: The EPA disagrees with the commenters' assertion that it is impossible to give an accurate assessment of the risks to human health from Ni emissions from EGUs, and maintains that its assessment of the potential inhalation risks from EGU emissions of Ni compounds is scientifically valid, reasonable, and based on the best-available current scientific understanding. To that end, in July 2011, the EPA completed an external peer review (using three independent expert reviewers) of the methods used to evaluate the risks from Ni and Cr compounds emitted by EGUs.[279] There were two charge questions relating to Ni in that review. First, do EPA's judgments related to speciated Ni emissions adequately take into account available speciation data, including recent industry spectrometry studies? Second, based on the speciation information available and what is known about the health effects of Ni compounds, and taking into account the existing URE values (*i.e.*, values derived by the Integrated Risk Information System,[280] California Department of Health Services,[281] and the Texas Commission on Environmental Quality[282]), which of the following approaches to derive unit risk estimates would result in a more accurate and defen-

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[279] U.S. EPA, 2011c.

[280] *U.S.* EPA, 1991.

[281] California Department of Health Services (CDHS) 1991. Health Risk Assessment for Nickel. Air Toxicology and Epidemiology Section, Berkeley, CA. Available online at *http://oehha.ca.gov/air/toxic_contaminants/html/Nickel.htm.*

[282] Texas Commission on Environmental Quality (TCEQ), 2011. Development Support Document for nickel and inorganic nickel compounds. Available online at *http://www.tceq.state.tx.us/assets/public/implementation/tox/dsd/final/june11/nickel_&_compounds.pdf.*

sible characterization of risks from exposure to Ni compounds?

1. To continue using the same approach as that developed for use in the 2000 NATA, which consists of using the IRIS URE for nickel subsulfide and assuming that nickel subsulfide constitutes 65 percent of the mass emissions of all Ni compounds.

2. To consider a more health-protective approach, based on the consistent views of the most authoritative scientific bodies (*i.e.*, NTP in their 12th ROC, IARC, and other international agencies) that consider Ni compounds to be carcinogenic as a group.

3. To make the same assumptions as in option 2, but considering alternative UREs derived by the CDHS or TCEQ.

In responding to these peer review questions, two of the reviewers agreed with the views of the most authoritative scientific bodies, which consider Ni compounds carcinogenic as a group. These reviewers, therefore, did not focus on the availability of Ni speciation profile data. The third reviewer recommended that EPA review several manuscripts on Ni speciation profiles showing that sulfidic Ni compounds (which the reviewer considered as the most potent carcinogens) are present at low levels in emissions from EGUs.

Nickel and Ni compounds have been classified as human carcinogens by national and international scientific bodies including the IARC,[283] the World

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[283] International Agency for Research on Cancer (IARC), 1990. IARC monographs on the evaluation of carcinogenic risks to humans. *Chromium, nickel and welding*. Vol. 49. Lyons,

Health Organization,[284] and the European Union's Scientific Committee on Health and Environmental Risks.[285] In their *12th Report of the Carcinogens*, the NTP has classified Ni compounds as known to be human carcinogens based on sufficient evidence of carcinogenicity from studies in humans showing associations between exposure to Ni compounds and cancer, and supporting animal and mechanistic data. More specifically, this classification is based on consistent findings of increased risk of cancer in exposed workers, and supporting evidence from experimental animals that shows that exposure to an assortment of Ni compounds by multiple routes causes malignant tumors at various organ sites and in multiple species. The *12th Report of the Carcinogens* states that the "combined results of epidemiological studies, mechanistic studies, and carcinogenesis studies in rodents support the concept that Ni compounds generate Ni ions in target cells at sites critical for carcinogenesis, thus allowing consideration and evaluation of these compounds as a single group".[286] Although the precise Ni compound (or compounds) responsible for the carcinogenic effects in humans is not always clear, studies indicate that Ni sulfate and the combinations of Ni sulfides and oxides encountered in the Ni refin-

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France: International Agency for Research on Cancer, World Health Organization Vol. 49:2[illegible]6.

[284] International Labour Organization/United Nations Environment Programme, World Health Organization (WHO), 1991. Nickel. In Environmental Health Criteria No 108 Geneva.

[285] European Commission, Scientific Committee on Health and Environmental Risks (SCHER), 2006. Opinion on: Reports on Nickel, Human Health part. SCHER, 11th plenary meeting of 04 May 2006 *http://ec.europa.eu/health/ph_risk/ committees/4_scher/docs/scher_o_034.pdf.*

[286] NTP, 2011.

ing industries cause cancer in humans. There have been different views on whether or not Ni compounds, as a group, should be considered as carcinogenic to humans. Some authors believe that water soluble Ni, such as Ni sulfate, should not be considered a human carcinogen, based primarily on a negative Ni sulfate 2-year NTP rodent bioassay (which is different than the positive 2-year NTP bioassay for Ni subsulfide).[287] [288] [289] Although these authors agree that the epidemiological data clearly supports an association between Ni and increased cancer risk, they sustain that the data are weakest regarding water soluble Ni. A recent review[290] highlights the robustness and consistency of the epidemiological evidence across several decades showing associations between exposure to Ni and Ni compounds (including Ni sulfate) and cancer.

Based on the views of the major scientific bodies mentioned above, and those of expert peer reviewers that commented on EPA's approaches to risk characterization of Ni compounds, the EPA considers all Ni

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[287] 287 Oller A. Respiratory carcinogenicity assessment of soluble nickel compounds. Environ Health Perspect. 2002, 110:841–844.

[288] Heller JG, Thornhill PG, Conard BR. New views on the hypothesis of respiratory cancer risk from soluble nickel exposure; and reconsideration of this risk's historical sources in nickel refineries. J Occup Med Toxicol. 2009, 4:23.

[289] Goodman JE, Prueitt RL, Thakali S, and Oller AR. The nickel iron bioavailability model of the carcinogenic potential of nickel-containing substances in the lung. Crit Rev Toxicol. 2011, 41:142–174.

[290] Grimsrud TK and Andersen A. Evidence of carcinogenicity in humans of water-soluble nickel salts. J Occup Med Toxicol. 2010. 5:1–7. Available online at *http://www.ossupmed.com/content/5/1/7.*

compounds to be carcinogenic as a group and does not consider Ni speciation or Ni solubility to be strong determinants of Ni carcinogenicity. With regards to non-cancer effects, comparative quantitative analysis across Ni compounds indicates that Ni sulfate is as toxic or more toxic than Ni subsulfide or Ni oxide.[291] [292]

Regarding the second charge question, two of the reviewers suggested using the URE derived by TCEQ for all Ni compounds as a group, rather than the one derived by IRIS specifically for Ni subsulfide. The third reviewer did not comment on alternative approaches. The EPA decided to continue using 100 percent of the current IRIS URE for Ni subsulfide because IRIS values are at the top of the hierarchy with respect to the dose response information used in EPA's risk characterizations, and because of the concerns about the potential carcinogenicity of all forms of Ni raised by the major national and international scientific bodies. Nevertheless, taking into account that there are potential differences in toxicity and/or carcinogenic potential across the different Ni compounds, and given that there have been two URE values derived for exposure to mixtures of Ni compounds that are 2–3 fold lower than the IRIS URE for Ni subsulfide, the EPA also considers it reasonable to use a value that is 50 percent of the IRIS URE for Ni subsulfide for providing an estimate of the lower end

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[291] Haber LT, Allen BC, Kimmel CA. Non-Cancer Risk Assessment for Nickel Compounds: Issues Associated with Dose-Response Modeling of Inhalation and Oral Exposures. Toxicol Sci. 1998. 43:213–229.

[292] NTP, 1996.

of a plausible range of cancer potency values for different mixtures of Ni compounds.

4. Cr Risk

Comment: One commenter stated there are several problems with EPA's analysis related to the fact that Cr emissions were evaluated as being entirely Cr(VI). The commenter stated that not all of the emitted Cr will remain in the hexavalent form by the time it reaches the target population, and that some may be converted to the much less toxic (and noncarcinogenic) trivalent species. The commenter also stated that the concentration levels considered in the case study assessment are far below occupational levels. The commenter concluded that EPA's cancer estimates should, therefore, be looked on with some skepticism. Another commenter stated that EPA's estimate of 12 percent Cr(VI) from coal-fired EGUs is unsupported, and that EPA failed to recognize that Cr(VI) is highly water-soluble and is easily reduced to Cr(III) in the presence of SO_2 in a low pH environment. The resulting Cr(III) would be expected to precipitate out in a FGD. The commenter stated that the actual amount of Cr(VI) that would be present in the emissions from an EGU with a wet scrubber is likely to be far lower than the 12 percent estimate made by EPA.

Several commenters questioned the validity of the chronic inhalation study by EPA because of (1) the use of surrogate speciated Cr emissions data instead of actual emissions data, (2) the assumption that units were run 100 percent of the time which is impossible, (3) dispersion modeling was used that is biased towards over predicting downwind impacts, and (4) estimated ambient concentrations were utilized as

substitutes for real exposure concentrations for all people within a census block.

Response: The EPA disagrees with the commenters' assertion that all Cr was considered to be hexavalent. As discussed in "Methods to Develop Inhalation Cancer Risk Estimates for Chromium and Nickel Compounds,"[293] existing test data for utility and industrial boilers indicate that Cr(VI) is, on average, 12 percent of total Cr from coal-fired boilers. This document underwent peer review by three external reviewers, and all three reviewers considered EPA's use of the values to be reasonable given the limited data available for Cr speciation profiling. The EPRI inhalation study for coal-fired boilers also used the 12 percent value.

The EPA also disagrees that units were assumed to operate 100 percent of the time. The dispersion modeling performed for the case study facilities used hourly heat input as a temporalization factor for estimating hourly emissions, and in some cases hourly heat inputs (and emissions) were zero or very low. The commenter provided no data or information to support their claim that the dispersion modeling EPA used is biased towards overestimating downwind impacts.

The EPA disagrees with the commenters' assertion that "real exposure concentrations for all people within a census block" must be considered because it runs counter to the long-standing approach that EPA has taken to estimate the maximum individual risk, or MIR. The MIR is defined by EPA's Benzene

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[293] U.S. EPA, 2011c.

NESHAP regulation of 1989[294] and codified by CAA section 112(f) as the lifetime risk for a person located at the site of maximum exposure 24 hours a day, 365 days a year for 70 years (*e.g.*, census block centroids). The MIR is the metric associated with the determination of whether or not a source category may be delisted from regulatory consideration under CAA section 112(c)(9). The MIR is the risk metric used to characterize the inhalation cancer risks associated with the case study facilities. The EPA used the annual average ambient air concentration of each HAP at each census block centroid as a surrogate for the lifetime inhalation exposure concentration of all the people who reside in the census block. The EPA has used this approach to estimate MIR values in all of its risk assessments to support risk-based rulemakings under CAA section 112 to date.

5. Acid Gas Risk

Comment: One commenter stated that acid gas emissions from oil-fired EGUs are not of the magnitude that triggered EPA's decision to regulate EGUs in general, raising the question of whether reduction (or even total elimination) of acid gas emissions from oil-fired EGUs could have any significant effect on EPA's goals of reducing non-cancer health risk or acidification of sensitive ecosystems in the U.S.

Several commenters stated that acid gas concentrations estimated in the case study facility assessment and the Utility Study do not exceed human health thresholds of concern. Two commenters stated that HCl emissions are negligible compared to other pri-

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[294] 54 FR 3804.

mary emissions (such as SO_2) that can lead to potential acidification of ecosystems.

Response: We do not agree with commenter's implication that Congress intended EPA to regulate only those HAP emissions from U.S. EGUs for which an appropriate and necessary finding is made, and commenter has cited no provision of the statute that states a contrary position. The EPA concluded that we must find it "appropriate" to regulate EGUs under CAA section 112 if we determine that a single HAP emitted from EGUs poses a hazard to public health or the environment. If we also find that regulation is necessary, the Agency is authorized to list EGUs pursuant to CAA section 112(c) because listing is the logical first step in regulating source categories that satisfy the statutory criteria for listing under the statutory framework of CAA section 112. *See New Jersey*, 517 F.3d at 582 (stating that "[s]ection 112(n)(1) governs how the Administrator decides whether to list EGUs * * *"). As we noted in the preamble to the proposed rule, D.C. Circuit precedent requires the Agency to regulate all HAP from major sources of HAP emissions once a source category is added to the list of categories under CAA section 112(c). *National Lime Ass'n* v. *EPA*, 233 F.3d 625, 633 (D.C. Cir. 2000). 76 FR 24989. The EPA discusses in the preamble to the proposed rule and this final action its concerns with HCl and other acid gas HAP emissions from EGUs and the Agency's approach for establishing section 112(d) standards for acid gas HAP.

6. EPRI Risk Analysis

Comment: Two commenters stated that a comprehensive tiered inhalation risk assessment (the EPRI study) using EPA-prescribed methods with improved

emission factors, fuel data, and confirmed stack parameters did not identify significant health risks (cancer or non-cancer) among U.S. coal-fired power plants (as they existed in 2007). The commenters noted that these results contrast with those presented by EPA for its non-Hg case studies on 16 (15 coal-fired) power plants. The commenters stated that several issues appear to underlie these differences, indicating the need for EPA to reevaluate its assessment and to undertake more refined (Tier 3) risk assessment for any facility of concern. Several commenters stated that for non-Hg HAP EPA produced one study on chronic inhalation risk assessment that identified three sites with cancer risks greater that one in a million for Cr(VI), which was authored by EPA staff and not peer reviewed. One commenter stated that EPA study is based on misinformation and overestimates assumptions, and that EPA has no data demonstrating health impacts from EGU emissions of non-Hg HAP, or the benefit from reducing such emissions. Two commenters stated that no benefits will be derived from the non-Hg HAP emission reductions associated with the proposed rule because no non-Hg HAP health risks were proven, and that no showing was made that EGU non-Hg HAP emission levels reach levels associated with adverse health effects. Another commenter stated that EPA must complete a comparable and separate national-scale risk assessment for non-Hg metals in order to determine appropriateness of proposing emissions standards for non-Hg metals.

Response: The commenters are incorrect in the assertion that EPA's case studies were performed with less rigor than the EPRI analysis. The EPRI analysis used a tiered approach to risk assessment, beginning

with Tier 1 using EPA's SCREEN3 dispersion model on all 470 coal-fired power plants in the U.S., and following with Tier 2 with EPA's Human Exposure Model (which uses the AERMOD dispersion model) for plants with higher risks from the Tier 1 modeling. Although tiered risk assessment is an appropriate approach, the Tier 2 modeling could have been more refined. For example, more meteorological data could have been used and building downwash could have been considered. The EPRI analysis ostensibly concluded that the Tier 2 modeling with HEM was conservative, and that because the modeled risks did not exceed certain thresholds, no further refinement was necessary. However, such refinements could result in higher modeled risks than those from the commenter's Tier 2 modeling.

The EPA's dispersion modeling of the case study facilities was actually performed with a greater degree of refinement than the EPRI analysis, and was consistent with EPA's *Guideline on Air Quality Models.*[295]

In contrast to the approach used in the EPRI analysis, the EPA used:

(1) 5 years of recent meteorological data from the weather station nearest to each facility, rather than one year of meteorological data. This is more representative of long-term (*i.e.*, lifetime) exposures and risks.

(2) Temporally-varying emissions based on continuous emissions monitoring data, rather than as-

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[295] Appendix W to 40 CFR Part 51.

suming a constant emission rate for each facility throughout the entire simulation.

(3) Building downwash, where appropriate.

(4) The latest version of AERMOD [version 11103].

The EPA's assessment of the case study facilities for the proposed rule concluded that three coal-fired facilities and one oil-fired facility had estimated lifetime cancer risks greater than one in a million. For the final rule, revisions were made to the case studies based on comments received, and the results indicate that five coal-fired facilities and one oil-fired facility had estimated lifetime cancer risks greater than one in a million.

Regarding peer review, the risk assessment methodology used by EPA for the case studies was consistent with the method that EPA uses for assessments performed for Risk and Technology Review rulemakings, which underwent peer review by the Science Advisory Board in 2009.[296] The SAB issued its peer review report in May 2010. The report generally endorsed the risk assessment methodologies used in the program. In addition, in July 2011, the EPA completed a letter peer review of the methods used to develop inhalation cancer risk estimates for Cr and Ni compounds.

f. Ecosystem Impacts From HAP

Comment: Two commenters assert that EPA is not justified in regulating acid gases based on concern about the potential that acid gases contribute to ecosystem acidification rather than concerns about haz-

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[296] U.S. EPA–SAB, 2010.

ards to public health. The commenters further claim that HCl's contribution to ecosystem acidification is de minimis. The commenters point out that EPA acknowledges uncertainty in quantification of acidification and EPA relies on recently published research[297] that is irrelevant to the question since it is based on research conducted in the peat bog ecosystem in the United Kingdom. Another commenter calls attention to several new studies published in a special issue of the journal *Ecotoxicology* devoted to the effects of MeHg on wildlife.

Response: Although EPA agrees that quantification of acidification effects has remaining uncertainty, the science and methodology has progressed in recent years. Based on recent peer reviewed research including Evans *et al.*,[298] acid gases can significantly contribute to acidification. The EPA published a comprehensive risk assessment of acidification effects of nitrogen and sulfur deposition[299] and a policy assessment.[300] Given the extent and importance of the

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[297] Evans, Chris D., Don T. Monteith, David Fowler, J. Neil Cape, and Susan Brayshaw. 2011. "Hydrochloric Acid: An Overlooked Driver of Environmental Change." *Environmental Science & Technology* 45 (5), 1887–1894.

[298] Id.

[299] U.S. Environmental Protection Agency (U.S. EPA). 2009. *Risk and Exposure Assessment for Review of the Secondary National Ambient Air Quality Standards for Oxides of Nitrogen and Oxides of Sulfur (Final).* EPA–452/R–09–008a. Office of Air Quality Planning and Standards, Research Triangle Park, NC. September. Available on the Internet at *http://www.epa.gov/ttn/naaqs/standards/no2so2sec/data/NOxSOxREASep2009MainContent.pdf.*

[300] U.S. Environmental Protection Agency (U.S. EPA). 2011d. *Policy Assessment for the Review of the Secondary National Ambient Air Quality Standards for Oxides of Nitrogen*

sensitive ecosystems evaluated in the review of nitrogen and sulfur deposition any substance that contributes to further acidification must be considered to be affecting the public welfare. The EPA disagrees that the peer reviewed study mentioned by commenter by Evans *et al.*, (2011) is not relevant to U.S. ecosystems. The paper presents evidence that show (1) that HCl is highly mobile in the environment, transferring acidity easily through soils and water, (2) that HCl can transport longer distances than previously thought (given its presence in remote ecosystems, and (3) that it can be a larger driver of acidification than previously thought. The fact that this study took place in the U.K. is itself irrelevant. The chemical interactions of HCl in water are the same the world over and sensitive ecosystems exist in the U.S. as well as in Europe as illustrated in the ecological risk assessment[301] for NO_x and SO_x. Furthermore, the commenter is factually incorrect that EPA is justifying that it is appropriate and necessary to regulate HAP emissions from EGUs based on this one study. The EPA agrees with the commenter that Hg exposure in wildlife is responsible for various adverse health effects in many species across the U.S. and recognizes that research is ongoing in this area. As discussed in the preamble to the proposed rule, the EPA agrees that there are potential environmental risks from exposures of ecosystems through Hg and non-Hg HAP deposition. The EPA cited relevant ar-

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and Oxides of Sulfur. EPA–452/R–11–005a. Office of Air Quality Planning and Standards, Research Triangle Park, NC. February. Available on the Internet at *http://www.epa.gov/ttnnaaqs/standards/no2so2sec/data/20110204pamain.pdf*.

[301] U.S. EPA, 2009.

ticles from the special edition of *Ecotoxicology*[302] mentioned by the commenter in the ecosystem effects section on Chapter 5 of the RIA for this rule, which is available in the docket.

G. EPA Affirms the Finding That It Is Appropriate and Necessary to Regulate EGUs To Address Public Health and Environmental Hazards Associated With Emissions of Hg and Non-Hg HAP From EGUs

In response to peer reviews of both the Hg and non-Hg HAP risk analyses, and taking into account public comments, the EPA conducted revised analyses of the risks associated with emissions of Hg and non-Hg HAP from U.S. EGUs. These revised analyses demonstrated that the risk results reported in the preamble to the proposed rule are robust to revisions in response to the peer reviews and public comments.

Specifically, the revised Hg Risk TSD shows that up to 29 percent of modeled watersheds have populations potentially at-risk from exposure to Hg from U.S. EGUs.[303] This 29 percent of watersheds with populations potentially at-risk includes up to 10 percent of modeled watersheds where deposition from U.S. EGUs alone leads to potential exposures that exceed the MeHg RfD, and up to 24 percent of modeled watersheds where total potential exposures to MeHg exceed the RfD and U.S. EGUs contribute at least 5 percent to Hg deposition. Each of these re-

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[302] *Ecotoxicology* 17:83–91, 2008.

[303] This corresponds to 28 percent of modeled watersheds with populations potentially at-risk in the analysis reported in the preamble to the proposed rule.

sults independently supports our conclusion that U.S. EGUs pose hazards to public health.

In the preamble to the proposed rule and in the 2000 finding, the EPA explained at length the serious nature of the health effects associated with Hg exposures, and the persistent nature of Hg in the environment. Congress specifically recognized the significant impacts of persistent bioaccumulative pollutants, like Hg, when it enacted section 112(c)(6), which requires the EPA to subject source categories listed pursuant to that section to MACT standards. Congress also required certain studies be conducted under CAA section 112(n) regarding the health effects of Hg. The EPA interprets CAA section 112(n)(1), with regard to Hg, as intended to protect the public, including sensitive populations, against exposures to Hg from EGUs that would exceed the level determined by the EPA to be without appreciable risk, *e.g.*, exposures that are above the RfD for methylmercury (MeHg), or would contribute additional risk in areas where Hg exposures exceed the RfD due to contributions from all sources of Hg. Our recent technical analyses show that 98 percent of the watersheds for which we had fish tissue data have total Hg deposition such that potential exposures exceed the MeHg RfD, above which there is an increased risk of adverse effects on human health. In these watersheds, any reductions in exposures to Hg will reduce risk, and thus the incremental contribution to Hg exposure from any individual source or group of sources, such as EGUs, may reasonably be anticipated to cause additional risk.

As we have explained, in calculating the estimates described above, the EPA has used peer-reviewed

methods, and focused on populations likely to be at higher risk of exposure to Hg from U.S. EGUs, *e.g.*, female subsistence fishing populations consuming at the 99th percentile fish consumption rate. The EPA did not, however, use the most conservative assumptions that would lead to upper bound risk estimates. As discussed above and in the revised Hg Risk TSD, we did not use the highest fish tissue cooking loss adjustment factor that was reported in the literature, which, had we done so, would have increased the estimates of Hg exposure substantially. Thus, we believe our analysis could understate risk to the most exposed individual, noting that we have focused on the 99th percentile consumption rate in our estimates.

Further, we were able to assess potential Hg exposures in only a small subset of generally representative watersheds in the U.S. because our analysis was necessarily premised on those water bodies for which we had fish tissue Hg samples. Specifically, we analyzed 3,141 of the approximately 88,000 watersheds in the United States. This limited set of watersheds excludes several of the watersheds with the highest U.S. EGU attributable deposition, and may also not have included watersheds with the highest sensitivity to Hg deposition, *e.g.*, the highest methylation rates (see above). Nevertheless, our analysis of the subset of watersheds we examined demonstrates that almost one third of the watersheds are estimated to have Hg deposition attributable to U.S. EGUs that contributes to potential exposures above the MeHg RfD. The SAB confirmed that the subset of watersheds we examined is sufficient.

Considering these points and the information on Hg in the record, the EPA believes that 10 percent of watersheds with populations at risk due to U.S. EGU emissions alone is unacceptable, as is 24 percent of watersheds with populations at risk due to U.S. EGU contributions in conjunction with total deposition from other sources. Taking into account the percentage of watersheds at risk, and the potential for even higher percentages to be at risk using more conservative risk assumptions and a more complete coverage of high U.S. EGU Hg deposition watersheds, the EPA concludes that Hg emissions from U.S. EGUs pose a hazard to public health.

Given these findings, and considering that (1) the revised risk analysis showed the percent of modeled watersheds with populations potentially at-risk increased from 28 to 29 percent, and (2) the revised analysis includes 36 percent more watersheds, which significantly expands the coverage in several states, we conclude that the finding that emissions of Hg from U.S. EGUs pose a hazard to public health is confirmed by the national-scale revised Hg Risk TSD. As a result, we conclude that it remains appropriate to regulate Hg emissions from U.S. EGUs because those Hg emissions pose a hazard to public health.

With regards to the revised non-Hg inhalation case studies, the highest estimated individual lifetime cancer risk for the one case study facility (out of 16) with oil-fired EGUs is estimated to be 20 in a million, driven by Ni emissions. For the facilities with coal-fired EGUs, there were five (out of 16) with maximum individual cancer risks greater than one in a million (the highest was five in a million), four of which were driven by emissions of Cr(VI), and one of

which was driven by emissions of Ni. Therefore, a total of six facilities exceed the criterion for EGUs to be regulated under CAA section 112. There were also two facilities with coal-fired EGUs with maximum individual cancer risks at one in a million. In the preamble to the proposed rule, we reported that the maximum individual lifetime cancer risk for the one facility with oil-fired EGUs was estimated to be 10 in a million, and that there were 3 coal-fired EGU facilities with maximum individual cancer risks greater than 1 in a million (the highest was 8 in a million), and 1 coal-fired EGU facility with maximum individual cancer risks equal to 1 in a million. Given that (1) the lifetime cancer risk for the oil-fired EGU facility has increased from 10 to 20 in a million, (2) the number of coal-fired EGU facilities with cancer risks greater than 1 in a million has increased from 3 to 5, and (3) the highest risk coal-fired facility still has cancer risks of 5 in a million, which is above the 1 in a million benchmark, we conclude that the finding that emissions of non-Hg HAP from U.S. EGUs pose a hazard to public health is confirmed by the revised non-Hg risk inhalation case studies.

Moreover, some HAP emissions from U.S. EGUs contribute to adverse ecosystem effects. While we did not do new analyses on these topics, we reiterate that (1) Hg emissions from U.S. EGUs pose a hazard to the environment, contributing to adverse impacts on fish-eating birds and mammals, (2) Hg is a persistent bioaccumulative environmental contaminant, and as a result, failing to control Hg emissions from U.S. EGU sources will result in long-term environmental loadings of Hg, above and beyond those loadings caused by immediate deposition of Hg within the U.S.; controlling Hg emissions from U.S. EGUs helps

to reduce the potential for environmental hazard from Hg now and in the future, and (4) it is appropriate to regulate those HAP which are not known to cause cancer but are known to contribute to chronic non-cancer toxicity and environmental degradation, such as the acid gases. In addition, we have identified effective controls available to reduce Hg and non-Hg HAP emissions.

In summary, we confirm the findings that Hg and non-Hg HAP emissions from U.S. EGUs each pose hazards to public health and that it remains appropriate to regulate U.S. EGUs under CAA section 112 for those reasons. We also conclude that it remains appropriate to regulate EGUs under CAA section 112 because of the magnitude of Hg and non-Hg emissions and the environmental effects of Hg and some non-Hg emissions, each of which standing alone, supports the appropriate finding. The availability of controls to reduce HAP emissions from EGUs only further supports the appropriate finding.

Our revised analyses still show that in 2016 after implementation of other provisions of the CAA, HAP emissions from U.S. EGUs are reasonably anticipated to pose hazards to public health; therefore, it is necessary to regulate EGUs under CAA section 112. Moreover, HAP emissions from U.S. EGUs are expected to continue to contribute to adverse ecosystem effects. In addition, based on evaluation of the regulations required by the CAA, including the recent CSAPR, it is necessary to regulate U.S. EGUs under CAA section 112 because the only way to ensure permanent reductions in HAP emissions from U.S. EGUs and the associated risks to public health and the environment is through standards set under CAA

section 112. While CSAPR is projected to achieve some Hg reductions due to co-control of Hg provided by controls put in place to achieve required reductions in SO_2 emissions, the results of the revised Hg Risk TSD indicate that an unacceptable percentage of modeled watersheds have populations potentially at-risk from U.S. EGU-attributable Hg deposition would remain after implementation of CSAPR. While we modeled slightly higher Hg emissions from U.S. EGUs (*i.e.*, 29 tons of Hg) in our risk analysis compared to the most recent estimate of 27 tons, we do not believe this 2 ton difference would substantially change our finding that Hg emissions from U.S. EGUs pose a hazard to public health or the Hg risks reported in the preamble to the proposed rule, as this represents less than a 10 percent reduction in Hg emissions. In addition, the actual reductions in Hg that will occur due to application of controls to meet the SO_2 emissions requirements of CSAPR may differ from those projected to occur, due to differences in the technologies that individual EGU sources choose to install. The only way to ensure reductions in Hg, including those modeled as resulting from the CSAPR, is to directly regulate Hg emissions under CAA section 112.

In summary, we confirm the findings that it is necessary to regulate HAP emissions from U.S. EGUs because (1) the national-scale Hg Risk TSD shows that the hazards to public health posed by Hg emissions from U.S. EGUs will not be addressed through imposition of the CAA, (2) we cannot be certain that the identified cancer risks attributable to U.S. EGUs will be addressed through imposition of the requirements of the CAA, (3) the environmental hazards posed by acidification will not be fully addressed

through imposition of the CAA, (4) regulation under CAA section 112 is the only way to ensure that all HAP emissions reductions that have been achieved since 2005 remain permanent, and (5) direct control of Hg emissions affecting U.S. deposition is only possible through regulation of U.S. emissions as we are unable to control global emissions directly. All of these findings independently support a finding that it is necessary to regulate U.S. EGUs under CAA section 112.

Based on these findings, the Agency affirms its finding that it remains appropriate and necessary to regulate coal- and oil-fired EGUs under CAA section 112, and maintains that the inclusion of coal- and oil-fired EGUs on the CAA section 112(c) list of source categories regulated under CAA section 112 remains valid.

[CONTENT OMITTED]

VII. Public Comments and Responses to the Proposed NESHAP

[CONTENT OMITTED]

F. Compliance Date and Reliability Issues

Comment: Multiple commenters asked that the compliance date be clearly stated as soon as possible, as well as that guidance be provided for utilities unable to comply with the stated timelines, to allow time for utilities to prepare for compliance. Commenters also asked that any decisions or policies on extensions be published in a rulemaking. In addition, commenters requested that the EPA establish, streamline, and simplify the process of applying for the 1-year extension under CAA section 112(i)(3).

Multiple commenters offered suggestions on methods for allowing more time for compliance, including EPA's authority under CAA section 112(n)(1)(A); state authority under CAA section 112(i)(3); Presidential authority under CAA section 112(i)(4); categorical extensions for publicly-owned or governmental facilities according to EO 13132, 13563, and UMRA of 1995; state-designed programs under the delegation provisions of CAA section 112; various Consent Decrees; Administrative Orders of Consent (AOCs); temporary waiver mechanisms; and adoption of MACT compliance schedules through minor permit modifications of a source's Title V federal operating permits. Absent such considerations for additional compliance time, many commenters suggested that the reliability of the nation's electric grid would be jeopardized as utility companies were forced to retire EGUs because they could not install the needed controls in the requisite time.

Compliance times requested by commenters ranged from 1 additional year (4 years total) to 6 additional years (9 years total). Multiple commenters requested that a utility be required to demonstrate good faith progress toward compliance to get any extension. Some commenters suggested that the EPA require utilities to submit a notice concerning which EGUs will be retrofitted or retired within 1 year of the effective date; that the compliance date align with the Power Year used by RTOs; and that the EPA clarify that retirement and any clean replacement power that complies with the NESHAP rule, including offsite combined heat and power and waste heat recovery, can be deemed "controls" under the CAA.

Commenters noted the specific situations related to small entities and their inability to compete with the larger, investor-owned utilities for financing and engineering and technical labor as well as the different process they need to follow for capital improvements. Multiple commenters asked that the EPA consider other simultaneous rulemakings (*e.g.*, Cooling Water Intake Structures; Coal Combustion Residuals; CSAPR, etc.) and extend the compliance period. Many commenters noted these other requirements and suggested that installation of the necessary controls could not be completed within the compliance period allowed under CAA section 112, even if a fourth year were to be granted by the permitting authority, citing examples of the times necessary for installation of various pieces of control equipment or replacement power.

Some commenters pointed to existing state programs (*e.g.*, Colorado, Oregon, Washington) and indicated that if states can demonstrate that overall

emissions reductions would be equivalent or greater than those that would be achieved by the proposed rule, the EPA should delegate the CAA section 112 program to these states, even if the state emissions reductions would not necessarily occur on the same schedule (many state programs call for retirement of EGUs in years beyond the CAA section 112 compliance date). The commenters did not want the promulgation of the final rule to undermine the significant amount of work that may have been invested in creating state-specific programs to curb emissions within a reasonable timeframe. The commenters seek to make use of temporal flexibility, authorized under CAA section 112(i)(3), in obtaining delegation of the final rule to preserve the hard-negotiated comprehensive state-specific programs designed to yield greater emission reductions than the MATS alone.

Other commenters requested that no additional time be granted for compliance. These commenters reference a number of reports (*e.g.*, by the URS Corporation, by M.J. Bradley & Associates and the Analysis Group, and by the Bipartisan Policy Center) to indicate that not only is technology readily available, but that the technology can typically be installed in less than 2 years and that the electric industry is well-positioned to comply with the EPA's proposed air regulations without threatening electric system reliability. Commenters assert that, if electric system reliability were to be threatened in local areas as a result of the rule, the EPA has the statutory authority to grant, on a case-by-case basis, extensions of time to complete the installation of pollution control systems. One commenter stated that no additional controls would need to be installed in many cases and any coal unit should be able to comply with all of the

standards. Another commenter noted that utilities that failed to plan ahead "should not be permitted to use their own inaction to justify more time." Commenters noted that several major utility companies have anticipated the EPA's rules and are already taking action to ensure a reliable supply of electricity in their service territory and beyond. Other commenters agree that there is significant excess generation capacity in the country and reliability will not be threatened by the rule. According to one commenter, companies are already preparing for a 2015 compliance date, factoring in the capital expenditures required to comply and delays would undermine decisions that have already been made. Commenters cite, for example, recent electricity forward capacity market auctions in the PJM market for the period of 2014 and 2015 that indicate that the capacity markets cleared with electricity reserve margins of 20 percent; this is in excess of the default reliability targets used by the North American Electric Reliability Corporation (NERC) for the year 2015. One commenter quoted NERC, stating that NERC does not see impacts from proposed climate legislation or anticipated EPA regulation as a reliability concern. Another commenter noted that the Building and Construction Division of the AFL–CIO has stated that there is no evidence to suggest that the availability of skilled manpower will constrain pollution control technology installation. In fact, according to the commenter, given the high levels of unemployment in the construction sector, these jobs are much needed.

A number of commenters expressed concern that the time frame for compliance with a regulation under CAA section 112(d) was too short for this indus-

try and would result in compromising the reliability of electricity supply. Commenters asserted that reliability would be compromised in several ways: (1) EGUs might have to temporarily close if the owner or operator is unable to install controls on the unit within the 3-year time frame or 3 years plus one; (2) the timing of outages to install controls will cause short term closures that could threaten grid stability; (3) owner/operators may shut down EGUs rather than invest in retrofits to keep them running and that these closures may cause a loss of critical generation; and (4) the construction of replacement generation or implementation of other measures to address reliability concerns due to plant retirements could take longer than 3 years, and that units slated for closure may be necessary beyond the 3-year compliance period but will be unable to run because they have not installed the necessary controls.

Response: Clean Air Act section 112 specifies the dates by which affected sources must comply with this rule. New or reconstructed units must be in compliance immediately upon startup or the effective date of this rule, whichever is later. Existing sources may be provided up to 3 years after the effective date to comply with the final rule; if an existing source is unable to comply within 3 years, a permitting authority has the ability to grant such a source up to a 1-year extension, on a case-by-case basis, if such additional time is necessary for the installation of controls.

As is explained earlier in this preamble, the 3-year compliance window is based on the date that is 60 days after publication of this rule in the **Federal Register**. Because publication doesn't occur until

several weeks after the rule is signed by the Administrator, the earliest required date for compliance would be sometime in March 2015. Because the last stage of control installations usually needs to occur when the unit is off-line and because scheduled outages are usually scheduled for the spring or fall months when peak electric demand is lower, this additional time is significant as it provides companies an additional outage period, the spring of 2015, to install controls.

The EPA has considered the concerns raised by commenters and has concluded that given the flexibilities further detailed in this section, the requirements of the final rule for existing sources can be met by most sources without adversely impacting electric reliability. In particular, EPA believes that the flexibility of permitting authorities to allow a fourth year for compliance should be available in a broad range of situations (as discussed below), and that this flexibility addresses many of the concerns that have been raised. Furthermore as indicated below, in the event that an isolated, localized concern were to emerge that could not be addressed solely through the 1-year extension under CAA section 112(i)(3), the CAA provides flexibilities to bring sources into compliance while maintaining reliability.

The EPA considered the impact that potential retirements in response to this rule will have on resource adequacy in order to gauge the rule's impact on reliability. In considering these impacts, the EPA considered both the analysis it has conducted as well as analyses conducted by a number of other groups. The EPA's analysis shows that the expected retirements of coal-fueled units as a result of this final rule

(4.7 GW) are fewer than was estimated at proposal and much fewer than some have predicted.[321] The net capacity reductions projected by the EPA make up less than one-half of one percent of the total generating capacity in the U.S. and about one and one-half percent of U.S. coal capacity. Because concerns have been raised that the use of DSI may not be as prevalent as the Agency has predicted and because this could lead to more coal retirements, the Agency also performed a sensitivity analysis in which fewer DSI systems and more scrubber systems were installed. In that sensitivity, we see approximately 1 more GW of retirements. This small change would have only a very small potential impact on resource adequacy. When considering the impact that one specific action has on power plant retirements, it is important to understand that the economics that drive retirements are based on multiple factors including: expected demand for electricity, the cost of alternative generation, and the cost of continuing to generate using an existing unit. The EPA's analysis shows that the lower cost of alternative fuels, particularly natural gas, as well as reductions in demand, will have a greater impact on the number of projected retirements than will the impact of this final rule.

The EPA's assessment looked at the capacity reserve margins in each of 32 subregions in the continental U.S. Demand forecasts used were based on EIA projected demand growth. The analysis shows

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[321] The EPA's analysis also identifies a small amount of capacity loss (less than 0.7 GW) due to derating of certain units, as well as partially offsetting reductions in non-coal retirements in comparison with the base case. The net estimated reduction in capacity, in comparison with the base case, is estimated at less than 5 GW.

that with the addition of very little new capacity, average reserve margins are significantly higher than required. The NERC assumes a default reserve margin of 15 percent while the average capacity margin seen after implementation of the policy is nearly 25 percent. Although such an analysis does not address the potential for more localized reliability concerns associated with transmission constraints or the provision of location-specific ancillary services (such as voltage support and black start service), the number of retirements projected suggests that the magnitude of any local reliability concerns should be manageable with existing tools and processes.

Several outside analyses have reached conclusions consistent with EPA's analysis. The DOE, in December 2011, published a report that looked at resource adequacy in the bulk power system when faced with a stress test which was a regulatory scenario far more stringent than EPA's regulations.[322] For this stress test, in addition to CSAPR and MATS requirements, each uncontrolled electric generator is required to install both a wet FGD system and a fabric filter to reduce air toxics emissions. If such installations are not economically justified, this scenario assumes that the plant must retire by 2015. In reality, as discussed previously, power plant owners will have multiple other technology options to comply with the regulations—options that typically cost less than installations of FGDs and fabric filters. The analysis finds that target reserve margins can be met in all regions, even under these stringent assump-

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[322] U.S. Department of Energy, December 2011, "Resource Adequacy Implications of Forthcoming EPA Air Quality Regulations."

tions. Moreover, in every region but one (TRE), no additional new capacity is needed. In TRE, the analysis finds that less than 1 GW of new natural gas capacity would be needed by 2015 beyond the additions already projected to occur in the Reference Case. This analysis also finds that the total amount of new capacity that would be added by 2015 is less than the amount that is already under development.

In June 2011, the Bipartisan Policy Center issued a report analyzing potential collective impacts of EPA's pending power sector rules and concluding that "scenarios in which electric system reliability is broadly affected are unlikely to occur."[323]

In August 2011, PJM Interconnection—the Regional Transmission Operator (RTO) responsible for planning and reliable operation of the bulk power system serving all or portions of 13 states in the Mid-Atlantic and Midwestern regions— issued a report analyzing the impacts of the CSAPR and the proposed MATS rule.[324] Although PJM's analysis assumes substantially more retirements than EPA projects, it nevertheless concludes that resource adequacy is not threatened in the PJM region. This is particularly significant, given that the PJM region is one of the largest and most heavily dependent on coal-fueled generation in the country. The PJM analysis notes, as EPA has acknowledged, that even where there is adequate generation capacity on a regional

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[323] Bipartisan Policy Center, June 2011, "Environmental Regulation and Electric System Reliability."

[324] PJM Interconnection, August 26, 2011, " Coal Capacity at Risk for Retirement in PJM: Potential Impacts of the Finalized EPA Cross State Air Pollution Rule and Proposed National Emissions Standards for Hazardous Air Pollutants."

basis, localized reliability issues may emerge in connection with retirements that may need to be addressed.

The EPA has reviewed industry and NERC studies suggesting, contrary to the EPA's and these other groups' analyses, that EPA rules affecting the power sector (including this final rule, the CSAPR, EPA's proposed rule addressing power plant cooling water intake systems under section 316(b) of the Clean Water Act (CWA), and EPA's proposed rule addressing coal combustion residuals under the Resource Conservation and Recovery Act) will result in substantial power plant retirements. Some of these studies predict that such levels of retirements will have adverse effects on electric reliability in some regions of the country. Although the specifics of these analyses differ, in general they share a number of serious flaws in common that call their conclusions into question.

First, most of these studies make assumptions about the requirements of the EPA rules that are inconsistent with, and dramatically more expensive than, the EPA's actual proposals or final rules. For example, a large proportion of the retirements projected by several of these studies is attributable to their inaccurate assumption that EPA's cooling water intake rule under CWA section 316(b) would require all or virtually all existing power plants to install cooling towers. In one study, the reliability effects reported are based on inaccurate assumptions that all existing EGUs with a capacity utilization factor of less than 35 percent would close, and that all in-scope electric generators would be required to install cooling towers within 5 years, whereas the not-selected options with closed cycle cooling in EPA's proposal

envisioned that permit authorities could exercise discretion to allow facilities 10 to 15 years' time to comply. In most cases, these analyses were performed before the CWA section 316(b) rule or the MATS rule were even proposed; even analyses subsequent to the CWA section 316(b) proposal continue to inaccurately portray EPA's proposed approach.

Second, in reporting the number of retirements, many analyses fail to differentiate between plant retirements attributable to the EPA rules and retirements of older, smaller, and less efficient plants that are already scheduled for retirement because owners have made business decisions, based in significant part on market conditions, not to continue operating them.

Third, most of these analyses fail to account for the broad range of responses available to address electric reliability concerns associated with power plant retirements, including upgrades to the transmission system, construction of new generation, and implementation of demand-side measures. These measures are discussed at greater length below.

As a preliminary matter, none of these situations, either alone or in combination, will necessarily lead to an electric reliability problem. There is excess generating capacity in the U.S. today and in most cases an EGU that closes, either temporarily until it comes into compliance or permanently, will not cause a reliability problem. As explained above, our modeling of the impact of this final rule at the regional level projects retirements of less than one percent of nationwide generating capacity and confirms that there will continue to be adequate capacity in all 32 subregions of the country as sources comply with the

rule.[325] This analysis shows that significantly less capacity will close in response to the final rule than might have under the proposal. Moreover, the regional modeling of retirements demonstrates that plants that close in response to this rule are spread out across the country rather than clustered in one area.

Outside analyses have identified many of the same flaws in studies projecting large-scale retirements as a result of EPA's power sector rules. For example, on August 8, 2011, the Congressional Research Service (CRS)[326] issued a report concluded that studies that assert that EPA rules will cause reliability problems, often make assumptions about the requirements of the rules that are inconsistent with, and dramatically more expensive than, the EPA's actual proposals. The CRS further noted that EPA's rules will primarily affect units that are more than 40-years old, that have not yet installed state-of-the-art pollution controls, and that are inefficient. Many of these plants are being replaced by combined cycle natural gas plants, driven more my lower gas prices than by EPA's regulations. The June 2011 Bipartisan Policy Center report referenced above likewise highlighted many of these same shortcomings in the studies in question.[327]

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[325] *See* Technical Support Document on Resource Adequacy in this Docket.

[326] James E. McCarthy and Claudia Copeland, Congressional Research Service, August 8, 2011, "EPA's Regulation of Coal-Fired Power: Is a 'Train Wreck' Coming?".

[327] Bipartisan Policy Center, June 2011, "Environmental Regulation and Electric System Reliability."

Although we do not expect to see any regional reliability problems, we acknowledge that there could be localized reliability issues in some areas—due to transmission constraints or location-specific ancillary services provided by retiring generation—if utilities and other entities with responsibility for maintaining electric reliability do not take actions to mitigate such issues in a timely fashion. There are many potential actions that could be taken to address this problem and multiple safeguards to assure a reliable electricity supply.

First, utilities can help to assure reliability through proactive steps in coordination with relevant planning and regulatory authorities. As we said in the proposal, early planning is key. The industry has adequate resources to install the necessary controls and develop the new capacity that may be required within the compliance time provided for in the final rule.[328] Although there are a significant number of controls that need to be installed across the industry, with proper planning, we believe that the compliance schedule established by the CAA can be met. Many companies have begun to do the detailed analysis and engineering and are ahead of others in their compliance strategy. There are already tools in place (such as integrated resource planning, and in some cases, forward auctions for future generating capacity) that ensure that companies adequately plan for, and markets are responsive to, future requirements such as this final rule.

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[328] As stated above, EPA has provided the maximum compliance time authorized under CAA section 112(i)(3)(A).

Second, companies that intend to retire EGUs should formally notify their RTO (or comparable planning authority in the case of non-RTO regions), state regulatory agencies, and regional reliability entities as soon as possible of their compliance plans, particularly with regard to any planned unit retirements. As we said before, in most places a closing plant will not be a cause for concern for reliability. The same is true of any outages required for retrofitting of units with controls. To the extent there is concern, however, early notification will provide an opportunity for transmission planners, market participants, and state authorities to develop solutions to avoid a reliability problem. In RTOs with forward capacity markets, owner/operators that do not bid generating capacity that they plan to shut down will provide an advance signal to market participants to take action to assure adequate future capacity. In all regions, early and public notification will allow market participants, planning coordinators and state authorities, as appropriate and in a timely fashion, to bring new generation on line, put demand side resources in place, and/or complete any transmission upgrades needed to circumvent a potential issue. Most RTOs only require 45 to 120 days notification of closure. In combined comments to EPA, 5 RTOs suggested that such notification should be made no later than 12 months after this regulation is final in order to allow a smooth transitioning to action to avoid a reliability problem. The EPA strongly encourages sources to provide notice to the RTOs as early as possible and believes that responsible owner/operators should and will do the early planning for compliance and provide early notification of their compliance

plans, especially where such plans include retiring one or more units.

On the supply side, there are a range of options including the development of more centralized power resources (either base-load or peaking) and/or the development of cogeneration or distributed generation. Even with the current large reserve margins, there are companies ready to implement supply-side projects quickly. For instance, in the PJM region, there are over 11,600 MW of capacity that have completed feasibility and impact studies; the units representing this capacity could be online by the third quarter of 2014.[329] The EPA notes, as well, that in the 3 years from 2001 to 2003, industry brought over 160 GW of generation on line.[330]

Demand side options include energy efficiency as well as demand response programs. These types of resources can also be developed very quickly. In 2006, PJM had less than 2,000 MWs of capacity in demand side resources. Within 4 years this capacity nearly quadrupled to almost 8,000 MW of capacity.[331] In addition to helping address reliability concerns, reducing demand through mechanisms such as energy efficiency and demand side management practices has many other benefits. It can reduce the cost of

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[329] Paul M Sotkiewicz, PJM Interconnection, Presentation at the Bipartisan Policy Commission Workshop Series on Environmental Regulation and Electric System Reliability, Workshop 3: Local, State, Regional and Federal Solutions, January 19, 2011, Washington, DC, *http://www.bipartisanpolicy.org/sites/default/files/Paul%20Sotkiewicz-%20Panel%202_0.pdf*, slide 6.

[330] Form EIA–860 Annual Electric Generator Report, *http://www.eia.gov/cneaf/electricity/page/eia860.html*.

[331] BPC slides cited above—slide 5.

compliance and has collateral air quality benefits by reducing emissions in periods where there are peak air quality concerns.

With regard to transmission, recent experience also shows that, in many cases, transmission upgrades to address reliability issues from plant closures can be implemented in less than 3 years. For instance, when Exelon notified PJM of its intention to retire four units,[332] it was determined that transmission upgrades necessary to allow retirement of two units could be made within 6 months of notification, transmission upgrades for the third unit would require slightly over 1 year and transmission upgrades to allow the fourth unit to retire could be made in approximately 18 months.[333]

The CAA allows CAA Title V permitting authorities the discretion to grant extensions to the compliance time of up to one year if needed for installation of controls. *See* CAA section 112(i)(3)(B)). If an existing source is unable, despite best efforts, to comply within 3 years, a permitting authority has the discretion to grant such a source up to a 1-year extension, on a case-by-case basis, if such additional time is necessary for the installation of controls. Id. Permitting authorities should be familiar with the operation of the 1-year extension provision because EPA has established regulations to implement the provision and

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[332] *http://www.exeloncorp.com/Newsroom/pages/pr_20091202_Generation.aspx?k=eddystone.*

[333] Cromby Units 1 and 2 and Eddystone Units 1 and 2—Deactivation Study, Updated September 7, 2010—*http://policyintegrity.org/documents/20100907-cromby-and-eddystone-retirement-study-posting-update.pdf.*

the provision applies to all NESHAP. *See* 40 CFR 63.6(i)(4)(A).

We believe that the permitting authorities have the discretion to use this extension authority to address a range of situations in which installation schedules may take more than 3 years including: staggering installations for reliability reasons or other site-specific challenges that may arise related to source-specific construction, permitting, or labor, procurement or resource challenges. Staggered installation allows companies to schedule outages at multiple units so that reliable power can be provided during these outage periods. It can also be helpful for particularly complex retrofits (*e.g.*, when controls for one unit need to be located in an open area needed to construct controls on another unit). The additional 1-year extension would provide an additional two shoulder periods (*i.e.*, seasons flanking annual high-demand periods) to schedule outages, thus enabling owners/operators to gain the full benefit of staggering outages in support of complex installations. The EPA believes that although most units will be able to fully comply within 3 years, the fourth year that permitting authorities are allowed to grant for installation of controls is an important flexibility that will address situations where an extra year is necessary. That fourth year should be broadly available to enable a facility owner to install controls within 4 years if the 3-year time frame is inadequate for completing the installation.

As we indicated at proposal, this source category is unique due to the large, complex and interconnected nature of electrical generation, transmission and distribution, and the critical role of the electric grid in

the functioning of all aspects of the economy. The grid functions as an interconnected system that supplies electricity to end users on a continuous basis. Safe, reliable operation of the grid requires coordination among actions taken at individual units, including timing of outages for the installation of controls, derating, or deactivation. It was for this reason that we specifically addressed in the proposed rule reasonable interpretations of the phrase "installation of controls" in CAA section 112(i)(3)(B). We determined that it was important to provide Title V permit authorities with information that might be useful if they were asked to authorize a fourth year for specific EGUs.

The EPA took comment on whether the construction of on-site replacement power could be considered the "installation of controls" such that a fourth year would be available while the replacement unit is being completed for a unit that is retiring (*e.g.*, a case when a coal-fueled unit is being shut down and the capacity is being replaced on-site by another cleaner unit such as a combined cycle or simple cycle gas turbine). After reviewing the comments, EPA believes that it is reasonable for permit authorities to allow the fourth year extension to apply to the installation of replacement power at the site of the facility. The EPA believes that building replacement power constitutes the "installation of controls" at a facility to meet the regulatory requirements.

Commenters were generally supportive of the proposed approach described above, but a number of commenters suggested several additional situations that should be considered as the "installation of controls" such that it would be appropriate for permit-

ting authorities to grant a 1-year extension beyond the 3-year compliance time-frame. In particular, commenters suggested that the 1-year extension should be available for a unit if a company's compliance choice was to retire that unit but doing so within the 3-year time-frame caused reliability problems for any of the following reasons: (1) Generation from the retiring unit is needed to maintain reliability while other units install emission controls; (2) new off-site generation was being built to replace the retiring unit, but the new generation was not scheduled to be operational within the 3-year time-frame and any gap between the time the existing unit retires and the new unit comes on line would cause reliability problems; and (3) transmission upgrades were needed in order to maintain electric reliability after the unit retired but could not be completed within 3 years.

While the ultimate discretion to provide a 1-year extension lies with the permitting authority, EPA believes that all three of these cases may provide reasonable justification for granting the 1-year extension if the permitting authority determines, for example, based on information from the RTO or other planning authority or other entities with relevant expertise, that continued operation of a particular unit slated for retirement for some or all of the additional year is necessary to avoid a serious risk to electric reliability.

In a case where pollution controls are being installed, or onsite replacement power is being constructed to allow for retirement of older, under-controlled generation, a determination that an extra year is necessary for compliance should be relatively straightforward. In order to install controls, compa-

nies will have to go through a number of steps fairly early in the process including obtaining necessary building and environmental permits and hiring contractors to perform the construction of the emission controls or replacement power. This should provide sufficient information for a permitting authority to determine that emission controls are being installed or that replacement power is being constructed. Because companies will need to develop this information early in the process and because a determination can easily be made as to whether the schedule will exceed 3 years, the EPA believes that Title V permitting authorities should be able to quickly make determinations as to when extensions are appropriate.

In the three cases related to retirement of a unit without construction of onsite replacement power, additional information is needed. The Title V permitting authority should request that the affected company or companies provide information, including, for example, from the RTO or other planning authority for the relevant region, the state electric regulatory agency, NERC or its regional entities, and/or FERC or the DOE, demonstrating that retirement of a particular unit within the 3-year compliance period would result in a serious risk to electric reliability.

The first two situations involving a retiring unit—where one or more related existing units are upgrading pollution controls or a new unit is being constructed off-site—are similar to the situation we discussed in the proposed rule wherein a retiring unit at a facility runs an additional year while a replacement unit on the same site is constructed. In each of these situations, the retiring unit would be allowed to run

so a unit compliant with the rule (either a retrofitted existing unit or a new unit) can come on line. We believe that these situations may, in the appropriate circumstances, constitute ones in which a 1-year extension for the retiring unit is "necessary for the installation of controls." In these two situations, however, we believe that it would be appropriate for the Title V permitting authority to consider reliability concerns as a necessary factor before granting the additional year because continuing operation of the retiring unit is only "necessary" to the extent it is required for reliability. In each of these situations, the permitting authority should determine that the retiring unit is necessary to maintain reliability until the new unit comes on line or the other existing unit is retrofitted. Title V permitting authorities may determine that multiple retiring units are available to maintain reliability, but unless all the units are necessary to address the issue, it would likely be unreasonable to provide the additional year for all the identified units.

The third hypothetical situation identified above is one in which transmission upgrades are necessary to address a reliability issue resulting from the retirement of a unit in order to comply with this rule, where the upgrade cannot be completed by the 3-year compliance date. In terms of the functionality of the electric grid, this situation has some similarity to those discussed above. Here, it is the completion of the transmission upgrades, rather than bringing another compliant (retrofitted or new) unit on line, that would allow the retiring unit to come into compliance (by retiring) without threatening reliability. The general objective and result is similar: Reductions of the existing unit's HAP emissions (through retire-

ment) while maintaining electric reliability. If such situations develop and the reliability problem has been properly demonstrated, permitting authorities should consider whether an extension under CAA section 112(i)(3)(B) may be provided.

The EPA continues to believe, based on the analysis discussed at the beginning of this section, that most, if not all, units will be able to comply with the requirements of this rule within 3 years. The EPA also believes that making it clear that permitting authorities have the authority to grant a 1-year compliance extension where necessary, in the range of situations described above, addresses many of the other concerns that commenters have raised. The EPA believes that the number of cases in which a unit is reliability critical and in which it is not possible to either install controls on the unit or mitigate the reliability issue through construction of new generation, transmission upgrades, or demand-side measures, within 4 years, is likely to be very small or nonexistent. This view is consistent with statements from commenters explicitly mandated with ensuring grid reliability.

The EPA's authority to provide relief from the requirements of this final rule beyond the fourth year is limited by the statute. If reliability issues do develop, however, the CAA provides mechanisms for sources to come into compliance while maintaining electric reliability. One area where the EPA has some measure of flexibility is with respect to the exercise of its enforcement authorities. The Agency has used such authority in the past to bring sources into compliance with the requirements of the CAA while maintaining electric reliability, although these au-

thorities are not as flexible as suggested by some commenters.

The EPA generally does not speak publicly to the intended scope of its enforcement efforts, particularly well in advance of the date when a violation may occur. In light of the importance of ensuring electric reliability, however, the Office of Enforcement and Compliance Assurance will separately publish a document that articulates our intended approach with respect to sources that operate in noncompliance with this final rule to address a specific and documented reliability concerns.

That document provides a pathway for reliability critical units (as such units are described in the document) to achieve compliance within an additional year. The result is that qualifying reliability critical units may come into compliance within up to 5 years. This pathway is structured to maintain reliability, to ensure CAA compliance and to increase certainty for sources in planning by allowing a unit owner/operator to determine whether it qualifies for a compliance schedule well in advance of the MATS compliance deadline.

The EPA believes that there will be few, if any, situations in which it will be necessary to have recourse to the processes discussed in the document just described, and that there are likely to be fewer, if any, cases in which it is not possible to mitigate a reliability issue within the further year contemplated under that document. However, there is always the possibility that some unit owner/operator will be unable to address its reliability issues within 5 years and there is always the possibility that a unit owner/operator will be unable to timely comply with the MATS for

some other reason. Consistent with its longstanding historical practice under the CAA, the EPA will address individual non-compliance circumstances on a case-by-case basis, at the appropriate time, to determine the appropriate response and resolution.

A number of commenters also raised concerns about inconsistencies between the compliance timelines under this final rule and existing state agreements with specific owners/operators to install pollution control equipment and/or retire EGUs. The EPA believes the flexibilities provided in this discussion allow for some discretion to address those cases, but that they may not be fully addressed. The EPA is supportive of such efforts and believes they can have important multi-pollutant health and environmental benefits. To the extent that the flexibilities discussed here do not fully address a particular situation, we encourage states and sources to contact the EPA as early as possible to discuss their individual circumstances.

G. Cost and Technology Basis Issues

1. Dry Sorbent Injection

Comment: Several commenters stated that there is limited commercial operating experience in using DSI to control acid gas emissions from coal-fired boilers. They suggest that the technology is not adequately proven for use in this application.

Other commenters disagree with statements made that DSI is not proven. One commenter stated that DSI is a mature technology. The commenter indicated that DSI is well suited for units that burn fuels with lower or mid-level sulfur contents, and is among the viable options available for a number of sources

to achieve the proposed HCl limits. Thus, the commenter believes that DSI represents a real technology control option for many units, and is among the suite of technology options that certain units will be able to employ to meet the proposed HCl limit.

Response: As explained in this response and elsewhere in this preamble, the EPA agrees that DSI technology is proven and ready for commercial use in controlling acid gases from coal combustion. One of the largest coal-burning electric utilities in the U.S, American Electric Power (AEP), pioneered the practical use of DSI with trona, a sodium-based sorbent, for SO_3 mitigation. American Electric Power has implemented trona injection for that purpose across its entire bituminous coal-fired fleet where both SCR and wet FGD systems are in place.[334] Examples of coal-fired EGUs already using trona DSI to control SO_2 emissions include NRG Energy's Dunkirk Generating Station Units 1–4 and CR Huntley Units 67 and 68 in New York.[335] The Dunkirk units range in size from 75 MW to 190 MW. Much larger units may also be economic when using DSI for SO_2 control, as suggested by Dominion Energy's studies of adding DSI on two 625 MW units at the Kincaid plant in Illinois.[336]

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[334] *SO_3 Control: AEP Pioneers and Refines Trona Injection Process for SO_3 Mitigation,* Coal Power, March 2007, *http://www.coalpowermag.com/plant_design/SO_3-Control-AEP-Pioneers-and-Refines-Trona-Injection-Process-for-SO_3-Mitigation_29.html.*

[335] NRG Energy letter to RGGI, Inc, November 22, 2010, *http://www.rggi.org/docs/NRG_Nov_2010.pdf.*

[336] Dominion Energy, *BART Analysis for the Kincaid Power Plant,* January 2009, *http://www.epa.state.il.us/air/drafts/regional-haze/bart-kincaid.pdf.*

One of the largest suppliers of air emission control systems in the world, vouches that DSI is commercially proven for acid gas control:[337] [338]

Comment: Numerous comments were received on EPA's IPM modeling of DSI in the MATS analysis. A few commenters stated that DSI will not work on bituminous coals. Some commenters stated that DSI is only suitable for use on low sulfur, low chlorine western coals. Others stated that DSI is only likely to be used on relatively small units, and that larger units would use scrubbers for acid gas control. Several commenters expressed the opinion that because there is little commercial operating experience in using DSI to control SO_2 emissions from coal-fired boilers, EPA's IPM modeling assumptions on the efficacy and cost of the DSI control option are unjustifiably optimistic. Some commenters believe that DSI will not be as economic or as widely applicable for either SO_2 or HCl control as projected by EPA's IPM modeling. Commenters observe that wet or dry scrubbers for FGD, longer-standing control technologies for SO_2 and HCl, are more complex systems with a much higher capital cost than DSI. These commenters argue that the sector will need to retrofit many more FGD scrubbers than projected by IPM for MATS compliance and will therefore experience a much higher overall cost of compliance than projected by IPM, as well as needing more time and resources for retrofit construction. A few commenters suggested

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[337] Dry Sorbent Injection Systems for Acid Gas Control, Babcock & Wilcox, 2010, *http://www.babcock.com/library/pdf/ps-451.pdf.*

[338] Technologies for Acid Gas Control, Babcock & Wilcox, 2011, *http://www.babcock.com/library/pdf/ps-457.pdf.*

that EPA should base its MATS modeling on this more conservative outlook. A few commenters were concerned that EPA's DSI modeling assumptions relied on performance data from only one DSI vendor.

Some commenters were concerned that fly ash currently sold for beneficial uses will become unsalable because it will be contaminated by injected sodium-based DSI sorbents. Two commenters argued that EPA's IPM analysis understates DSI cost by not including the costs of foregone fly ash sales revenue and contaminated fly ash disposal. A few commenters observed that landfilling of sodium-based DSI solid wastes will produce leachate containing sodium and other compounds that are challenging to handle, thus requiring special landfill designs and a high cost for landfill disposal of DSI waste.

Response: The EPA believes that its representation of DSI in MATS compliance modeling is reasonable, is properly limited to applications that are technically feasible, and reflects a conservative approach to modeling future use of this technology.

The EPA disagrees that its IPM modeling of DSI is overly optimistic and therefore underestimates the costs of MATS compliance. In its IPM modeling, EPA restricts the availability of the DSI option to only those units that use or switch to relatively low sulfur coal: Less than 2 lb SO_2/MMBtu (*see* IPM documentation in the docket). The EPA's IPM projections for MATS compliance, therefore, already include the costs of any additional FGD scrubbers that are economically justified and projected for use on units using higher sulfur coals. The EPA models DSI assuming fine-milled trona as the injected sorbent. As mentioned by several commenters, sodium bicar-

bonate (SBC), which is processed from trona, is also suitable for use with DSI. Sodium bicarbonate is more reactive with acid gases than trona. It would require less tonnage of sorbent and less tonnage of waste disposal than trona for the same SO_2 removal effect, albeit at somewhat higher sorbent cost. Non-sodium based sorbents such as hydrated lime (calcium based) could also be used. Therefore, EPA's modeling of DSI technology does not include the full spectrum of sorbent choices that real-world applications enjoy, meaning that there may be opportunities for lower-cost applications of DSI that are not captured in EPA's projections for MATS. The EPA models DSI with trona injection rates corresponding to 70 percent SO_2 removal for all coals, assuming that an equivalent amount of sorbent is needed to provide 90 percent HCl removal, regardless of the low sulfur and chlorine content of western coals.

Senior technical staff from the EPA have carefully evaluated the key assumptions regarding the cost and operation of emission control technologies. In general, these staff believe that trona should have strong HCl reaction selectivity and, consequently, EPA's assumed trona injection rates may be overstated. The extent to which this assumption may actually overstate DSI control costs can be observed through DSI pilot testing for Solvay Chemicals by the Energy & Environmental Research Center (EERC) at the University of North Dakota.[339] The EERC's

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[339] Solvay Chemicals, Inc., HCl Removal in the Presence of SO_2 Using Dry Sodium Sorbent Injection, *http://www.solvair.us./SiteCollectionDocuments/presentations/20111214_hcl_presentation.pdf.*

testing of trona DSI on a central Appalachian bituminous coal (1.3 lb SO_2/MMBtu) substantiates the strong HCl reaction selectivity of sodium-based sorbents, including trona, and calcium-based hydrated lime. The EERC's pilot testing shows that fine-milled trona, when well mixed into 325 °F flue gas upstream of a FF, provides 90 percent HCl removal at a SO_2 removal rate of less than 20 percent (as compared to EPA's modeling assumption of aligning 90 percent HCl removal with sorbent injection designed to achieve 70 percent SO_2 removal). The data show that 95 percent or higher HCl removal is readily obtained at somewhat higher SO_2 removal rates. Similarly strong HCl selectivity results were obtained using trona and an ESP at 650 °F. Test data from United Conveyor[340] on full-scale units also show these high HCl selectivity trends. Overall, these test data from multiple major vendors suggest that even if a SO_2 removal rate of 30 percent were required in order to obtain 90 percent HCl removal in the imperfectly mixed flow of a full-scale unit, it still appears that EPA's assumed trona injection rates may be as much as twice as high as would actually be needed in practice for certain applications. It is apparent that if EPA were to re-analyze MATS compliance with DSI injection rates reduced by 50 percent, there would be a corresponding reduction in the sorbent and related waste disposal costs that constitute most of the cost of using DSI.

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[340] United Conveyor Corporation, *Dry Sorbent Injection for Simultaneous SO_2, HCl, and Hg Removal*, October 2011, *http://unitedconveyor.com/uploadedFiles/Systems/Systems_Sub/McIlvaine%20Multipollutant%20Removal%20Oct%202011.pdf*.

Given the EERC test data, it is also apparent that most units that have ESPs and are burning low sulfur western coal could meet the HCl limit using DSI without the addition of a FF. If EPA were to reanalyze MATS compliance while allowing DSI use without the need for a downstream FF, it is apparent that there would be a very significant reduction in the overall number of FF retrofits projected, and a corresponding reduction in annualized capital costs. For the MATS proposal, the EPA modeled DSI on the assumption that all chlorine in coal converts to HCl, and that DSI would be the only mechanism by which the unit could prevent HCl from being emitted. Based on public comments and a more thorough review of the ICR data, the EPA has introduced in final MATS modeling a recognition that the relatively high alkalinity of ash from subbituminous and lignite coals "removes" much of the HCl that would otherwise be emitted from combustion of these particular coals. The 2010 ICR data indicate that in some cases the ash itself removes sufficient HCl from these coals for MATS compliance; in effect, these acid-gas emissions are absorbed by coal ash and are captured by particulate control devices instead of being emitted in gaseous form. As a conservative measure, EPA's revised final MATS modeling assumes that 75 percent of HCl is removed by the ash for these coals. In the event that ash capture in practice is more effective than this 75 percent assumption, then EPA's analysis projects a conservatively higher level of DSI installations (and, thus, compliance cost) than would actually occur in practice. In any case, it appears that significantly less sorbent injection would actually be required in practice than assumed by EPA for these low sulfur, low chlorine coals, and that the IPM projected

DSI operating costs are likewise higher for these coals than would be experienced in practice.

The EPA models DSI with sorbent injection occurring downstream of an existing electrostatic precipitator (ESP). The existing ESP is assumed to remain in service. The model adds a fabric filter downstream of the DSI injection point to capture the small amount of PM passing through the ESP plus the reacted and unreacted DSI sorbent. Most of the DSI projected by IPM, therefore, includes the costs of a retrofitted FF. This modeled configuration allows fly ash currently captured in ESPs to remain uncontaminated by DSI sorbent and, therefore, remain available for sale and beneficial use. The EPA conservatively models FF costs based on an assumed full-size system with an air-to-cloth ratio of 4.0. The FF costs could be somewhat less in practice if a smaller system (with an air-to-cloth ratio of 6.0) were used for the reduced DSI dust loading. The EPA observes that some of the owners of units with ESPs may chose to convert existing ESPs into FFs,[341] an option not modeled in IPM, but that would likely have a lower capital cost than a retrofitted FF. In the MATS proposal EPA modeled DSI with a waste disposal cost of $50/ton, based on a Sargent & Lundy DSI cost model prepared for EPA (*see* proposal IPM documentation in the docket). The EPA has continued to model DSI at this waste disposal cost for analysis of the final rule. However, recent discussions between

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[341] TW Lugar, *et al., The Ultimate ESP Rebuild: Casing Conversion To a Pulse Jet Fabric Filter, a Case Study,* Electric Power Conference, May 2009, *http://www.cecoenviro.com/uploads/ESP%20to%20Fabric%20Filter%20Baghouse%20Conversion%20-%20Buell%20Case%20History.pdf.*

senior technical staff from the DOE and the EPA have suggested that in some situations sodium sulfates, that would be formed by the injection of trona, could potentially leach out of the fly ash/sorbent mixture on contact with water. Although the technical staff recognized that these concerns are more relevant to bituminous coal-fired units where ashes are not cementitious, unless mixed with limestone or lime, they suggested that the impacts of potentially higher disposal costs be evaluated. Based on public comments, further investigations by Sargent & Lundy, and suggestions from the EPA and DOE technical staff, EPA's analysis of the final rule has included an IPM sensitivity case using a DSI waste disposal cost of $100/ton. The sensitivity case indicates that a 100 percent increase in assumed DSI waste disposal cost produces slightly less than a 1 percent increase in the projected cost of the rule.

Comment: A few commenters expressed the concern that there is an inadequate supply of trona to support DSI operations at the levels projected by the EPA for MATS compliance.

Response: The EPA projects that just over 50 GW of coal-fired capacity might retrofit with DSI for MATS compliance, thus reducing SO_2 emissions by about 1 million tons per year. Based on conservatively high trona injection rates, as discussed above, the EPA estimates that the amount of trona required to support DSI operations at this level is about 4 million tons per year. By comparison, the trona mining industry in the U.S. has a demonstrated production capacity of at least 18 million tons annually, and was running well below that capacity (16.5 million tons)

in 2010.[342] [343] If the EPA's assumed trona injection rates are as much as 50 percent greater than actually needed for at least 90 percent HCl control, as discussed above, and given that some subbituminous coals will apparently need little or no sorbent injection for HCl control, there may already be an adequate surplus of trona production capacity to support DSI for MATS compliance. The EPA, therefore, concludes that trona supply for DSI is either already adequate, or will require at most a small increase in production capacity.

For all of these reasons, the EPA believes that its representation of DSI in MATS compliance modeling is reasonable, is properly limited to applications that are technically feasible, and reflects a conservative approach to modeling future use of this technology.

2. Economic Hardship

a. Job Losses and Economic Impacts

Comment: Several commenters indicated that they believe the proposed rule will weaken industry, cause job losses and hurt power consumers. One commenter reported that the proposed rule will affect 1,350 coal and oil-fired units at 525 power plants and that NERC reports that by 2018 nearly 50,000 MW of capacity will be retired by the proposed rule. Many of these commenters compared the cost estimated by EPA to a variety of other sources that estimate substantially higher costs of the rule. The commenters expressed concern that electricity price increases are

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[342] *http://www.wma-minelife.com/trona/tronmine/tronmine.htm.*

[343] *http://www.wma-minelife.com/trona/TronaPage2/trona_production.htm.*

likely to be up to 24 percent in some regions as a result of the proposed rule. In addition to the economic difficulty the proposed rule could place on consumers, the commenter believes that many in the energy sector will lose their jobs due to coal-fired capacity losses. The commenters believe the effects on coal-fired plants in the Southeast especially will mean the loss of high-paying, high-skilled jobs and drastic price increases in energy costs. Additionally, commenters expressed concern that increased electricity and natural gas prices would impact businesses in multiple sectors across the country.

Response: The EPA disagrees with the estimates presented by the commenters. The EPA has updated its analysis to reflect the final MATS. The Agency estimates the annual costs of the final rule in 2015 to be $9.6 billion in 2007 dollars. The estimate of early retirements of coal-fired units due to this rule is 4.7 GW, lower than the level estimated at proposal. Both of these estimates were prepared using the IPM, a model that has been extensively reviewed and has been utilized in several rulemakings affecting the power generation sector over the last 15 years. The Agency's analyses are credible and accurate to the extent possible, and all assumptions and data are made public. Limitations and caveats to these analyses can be found in the RIA for this rule.

The EPA estimates that there will be an increase of 3.1 percent in retail electricity price on average in the contiguous U.S. in 2015 as an outcome of this rule, with the range of increases from 1.3 percent to 6.3 percent in regions throughout the U.S. No region of the U.S. is expected to experience a double-digit increase in retail electricity prices in 2015 or in any

year later than that, according to the Agency's analysis, as a result of this rule. To put this in context, the roughly 3 percent incremental increase in aggregate end-user electricity prices projected to occur over the next 4 years is about the same as the 3 percent absolute average change in total end-user electricity prices observed on an annual basis.[344] Furthermore, the roughly 3 percent incremental price effect of this rule is small relative to the changes observed in the absolute levels of electricity prices over the last 50 years, which have ranged from as much as 23 percent lower (in 1969) to as much as 23 percent higher (in 1982) than prices observed in 2010.[345] Even with this rule in effect, electricity prices are projected to be lower in 2015 and 2020 than they were in 2010.[346]

The Agency found that the readily discernible impact on long-term employment nationally within the most directly affected sectors should be small and the EPA also estimated that about 46,000 job-years[347] of one-time construction labor could be supported or created by this rule. This includes jobs manufacturing steel, cement and other materials needed to build pollution control equipment, jobs creating and as-

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[344] EIA Annual Energy Outlook 2010 annual total electricity prices from 1960 to 2010, Table 8–10.

[345] Ibid, EIA AEO 2010, Table 8–10.

[346] Ibid, EIA AEO 2010, Table 8–10 for price levels; and Chapter 3 of the RIA for electricity price differential.

[347] A "job-year" is a combined measure of jobs and job duration which is equivalent to one person being employed for one year. For example, 2 job-years could represent two years of employment for one worker, one year of employment for two workers, or 6 months of employment for four workers. Estimates of employment changes that involve non-permanent workers are usually reported in job years to give a sense of the total employment effects.

sembling pollution control equipment, and jobs installing the equipment at power plants. Potential job increases from increased output by lower-emitting facilities (such as increased generation from well-controlled coal-fired plants that replace generation from older coal-fired plants) are expected to partially or fully offset potential job losses resulting from reduced output from higher-emitting facilities. The EPA analysis projects a net change in the directly affected EGU sector of between 15,000 net jobs lost to 30,000 net jobs gained on an annual basis.[348] See Chapter 6 of the RIA for further details.

The EPA has also looked at the possibility that changes in the price of electricity may influence the levels and geographic distribution of downstream economic activities, and associated employment. Projecting how potentially higher electricity prices may affect various downstream economic activities in particular regions as a result of this rule is challenging for several reasons: (1) There are significant uncertainties regarding projections of consumer- and location-specific electricity price changes in response to future firm-specific compliance strategies; (2) the availability of competitively-priced alternative energy sources (including energy conservation) and less electricity-intensive substitute goods and services may significantly mitigate potentially adverse economic consequences resulting from projected increases in electricity prices in ways which are not captured ef-

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[348] It should be noted that if more labor must be used to produce a given amount of output, then this implies a decrease in labor productivity. A decrease in labor productivity will cause a short-run aggregate supply curve to shift to the left, and businesses will produce less, all other things being equal.

fectively in currently available models; and (3) available modeling tools are not configured to capture the effects over time of economically significant effects of cleaner air (*e.g.*, reductions in medical expenditures and improvements in labor productivity resulting from fewer lost work days) achieved by rules evaluated using single target year criteria pollutant and/or HAP benefits projections. After considering these methodological limitations, the Agency concludes that there is not a satisfactory methodology for projecting the downstream economic (including employment) effects of any changes in electricity prices due to this rule.

We expect the downstream economic effects of this rule to be small because electricity is only a small factor in the production of most goods and services.[349] A 3 percent increase in end-user electricity prices translates to a much smaller effect on prices and potential output of goods and services from end-users of electricity. Over time, the incremental effect of this rule on electricity prices is projected to diminish significantly; for example the difference in expected prices is projected to narrow from 3.1 percent in 2015 to 2.0 percent in 2020 as shown in Chapter 3 of the RIA.

Despite the absence of a satisfactory methodology for quantifying the potential economy-wide effects (including employment) of any potential increases in electricity prices resulting from this rule, the EPA expects the incremental effects of this rule on elec-

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[349] BEA. (2007b). Commodity-by-Industry Direct Requirements after Redefinitions, 2002. Available in: *2002 Summary Tables, 2002 Benchmark Input-Output Data.* Retrieved from *http://www.bea.gov/industry/io_benchmark. htm#2002data.*

tricity prices to be small given the projected electricity price increases relative to historical levels and volatility in end-user electricity prices. Based on these projections and contextual information, the Agency believes that the incremental effects on electricity prices and economic activity of this rule are likely to be small relative to other factors influencing electricity prices, overall employment, and other aspects of economic activity.

Comment: Several commenters considered the proposed rule to be a tax on the American public, since utilities implementing upgrades will pass the costs on to the consumer. Commenters questioned the preference of Americans to subsidize renewable energy sources and put money into the proposed rule instead of other environmental programs with greater benefits. Commenters explained that the tax-like price increase reduces income of energy consumers and depresses business development. The commenters used California as an example of a state that uses low rates of coal-based electricity and cites companies that have left the state as a result of substituting higher cost forms of electricity for coal. A commenter stated that coal-derived energy will rapidly become more expensive, especially in the "rust belt" and Southeast region, as can be seen by the rate increase already requested in Louisville. A commenter believes the "indirect taxation" limits the ability of the economy to absorb the cost of retrofitting and new capacity projects, lowers discretionary spending and leads to job losses and lost tax revenues, given the restrictive timeframe for compliance.

Response: The Agency does not agree that this rule creates or alters any taxes on affected sources re-

quired under this rule to reduce their emissions of toxic air pollutants, nor are taxes created or altered or imposed on consumers of electricity which is provided to the market by affected sources. Moreover, unlike a tax, this rule does not generate government revenue. The rule does, however, indirectly address the problem of the "externality cost" of higher health risks and other adverse effects on the populations exposed to toxic air pollution emissions from affected sources. This rule may have the effect of reducing or eliminating a market distortion that provides an implicit subsidy to affected facilities. This implicit subsidy results from the fact that some facilities currently can avoid the costs of toxic air pollution controls by imposing higher health and other costs on those who are exposed to higher levels of toxic air pollution. The Agency also disagrees with the implication that the costs incurred by less-controlled sources to bring their toxic air emissions in line with their better-controlled competitors will lead to significant or debilitating changes in market and economic conditions. The Agency's estimate of the potential increase in retail electricity price is an average of 3.1 percent in 2015, with a range of increases by region from 1.3 percent to 6.3 percent. As shown in Chapter 3 of the RIA, the higher rates of potential electricity price increase tend to occur in those regions where electricity prices have been relatively low, due to some extent to reliance on coal-fired units which have been cheaper to operate due to underinvestment in toxic air pollution controls.[350] As shown in Chapter 3 of the RIA, all regions with year 2015 projected percentage increases in retail electricity prices above the contiguous

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[350] *http://www.epa.gov/airmarkets/images/CoalControls.pdf.*

U.S. average are also projected to have baseline retail electricity prices which are below the contiguous U.S. average price level in that year. In addition, natural gas prices will only increase by 0.3 to 0.6 percent on average over the time horizon of 2015 to 2030. As discussed above, for consumers of electricity in the commercial and industrial sectors, electricity tends to be a fairly small fraction of total costs of production, implying that the average projected electricity price increase of 3 percent will lead to only a small fractional change in the costs of providing goods and services to the economy. While some residential electricity consumers may similarly see a small price increase in retail electricity prices, it should be noted that these consumers tend to reside in the same area or region as the affected facility and so will also experience the improvement in air quality from the reductions due to the rule. The reduction in health risk and other improvements to quality of life associated with lower exposure to toxic and other air pollutants achieved by this rule will confer benefits on these consumers which include lower risks of premature mortality, lower morbidity, and improved productivity and competitiveness of U.S. workers due to reduction in work days lost to air pollution-related illness. The benefits of these improvements are projected to exceed costs of compliance by affected sources by at least six-fold. The potential price increases in electricity and natural gas should be considered in light of the substantial health, welfare, and economic benefits achieved by this rule.

Comment: Many commenters expressed support for the EPA's impact analysis and disputed claims by other commenters that the projected rule will harm economic growth. A number of commenters men-

tioned testimonials by power company CEOs stating that the proposed rule will not affect the economic health of the industry and a survey showing nearly 60 percent of the coal-fired units already comply with the EPA's proposed Hg standard, and several other meaningful quotes from utility executives. The commenters also pointed out that 17 states already require plants to address Hg pollution, with some imposing more stringent emission limits than the EPA proposes. The commenters believe that utilities use the threat of power plant closures and lost jobs to delay Hg reductions from coal-fired plants. Commenters also believe that the rules will drive innovation and job creation as new technologies to reduce pollution are created. Several commenters quoted the Economic Policy Institute finding that the proposed rule will increase job growth by 28,000 to 158,000 jobs by 2015 (including approximately 56,000 direct jobs and 35,000 indirect jobs), the University of Massachusetts study that showed an increase 1.4 million jobs in 5 years, and the Constellation Energy Group installation project that employed nearly 1,400 skilled workers. Commenters also cited the University of Massachusetts study statement that a net gain of over 4,200 long-term operation and maintenance jobs will result.

Several commenters observed that the positive impacts of the rule strongly favor its adoption. These commenters stated that, contrary to the unfounded assertions by critics of EPA and the rule, EPA has conducted a technically sound and conservative benefit-cost analysis showing that the proposed rule's estimated benefits are at least five times as high as its costs. One commenter stated, "With sound, albeit unduly conservative, econometric modeling, EPA has

also determined that the Toxics Rule will promote economic growth and create jobs in both the long and short term." Two commenters cited the EPA impact analyses by Dr. Charles Cicchetti which confirm this finding and state that the analysis underestimates the rule's net benefits and positive impacts on the nation's economy. By considering some benefits not monetized in the EPA analysis, Dr. Cicchetti concludes that the proposed rule will create $52.5 to $139.5 billion in net benefits annually, create 115,200 jobs, generate annual health savings of $4.513 billion, annual increases in GDP of $7.17 billion and $2.689 billion in additional annual tax revenues, and spur innovation and modernization of EGUs. The commenters state that the study findings show no need to delay implementation of the rule or needlessly duplicate economic analyses already completed.

Commenters reported that multiple researchers confirmed that the EPA's estimates of economic stimulus are conservative and that the proposed rule will stimulate job growth. A commenter quotes Dr. Josh Bivens of the Economic Policy Institute, who also found that EPA's conclusions were conservative. Dr. Bivens concluded, "The EPA RIA on the proposed toxics rule makes a compelling case that the rule passes any reasonable cost-benefit analysis with flying colors—the monetized benefits of longer lives, better health, and greater productivity dwarf the projected costs of compliance * * * Whether regulation in general and the toxics rule in particular costs jobs is an empirical question this paper attempts to answer. In particular, this paper examines the possible channels through which the proposed toxics rule could affect employment in the United States and finds that claims that this regulation destroys jobs are flat

wrong: "The jobs-impact of the rule will be modest, but it will be positive." His report details the following major findings:

1. The proposed rule would have a modest positive net impact on overall employment, likely leading to the creation of 28,000 to 158,000 jobs between now and 2015.

2. The employment effect of the [MATS] on the utility industry itself could range from 17,000 jobs lost to 35,000 jobs gained.

3. The proposed rule would create between 81,000 and 101,000 jobs in the pollution abatement and control industry (which includes suppliers such as steelmakers).

4. Between 31,000 and 46,000 jobs would be lost due to higher energy prices leading to reductions in output.

5. Assuming a re-spending multiplier of 0.5, and since the net impact of the above impacts is positive, another 9,000 to 53,000 jobs would be created through re-spending.

Response: The EPA thanks the commenters for these observations. The Agency's estimates of employment impacts, found in the RIA for the rule, are smaller than those identified by the some commenters, though the EPA uses a different methodology that focuses on impacts specific to the electric power sector.

b. Impacts on Low-Income Consumers

Comment: Commenters expressed concern that the EPA's overview of the price increases does not consider the hardships that will be the reality of in-

creased prices on low-income or fixed-income households or small businesses. The commenter reports increases of $90 million in capital costs, $11.4 million in annual operating costs and $6.4 million in annual debt service costs to achieve compliance, which will lead to a 13 percent increase in rates for the proposed rule, and a 41 percent increase for all proposed and new regulation compliance costs. The commenter argues against the EPA's view that energy efficiencies will offset rate increases, because low income customers will need to use less electricity due to economic necessity. The commenter also sees large price increases for customers if units are converted to natural gas, which is approximately 2.5 times more expensive than the coal that the commenter currently uses to generate electricity.

Response: The EPA's estimates of increase, relative to the baseline, in the retail electricity price range from 1.3 percent to 6.3 percent regionally in 2015, with an average increase nationwide of 3.1 percent in 2015. Low-income households will thus see some increase in electricity price, but this increase should be modest. In addition, the increase in the price of natural gas as a result of this rule is expected to be 0.3 to 0.6 percent over a time horizon of 2015 to 2030. This increase in price is low enough that electricity customers should not experience a major increase in price resulting from any modest changes to electricity generated by natural gas. The roughly 3 percent incremental price effect of this rule is small relative to the changes observed in the absolute levels of electricity prices over the last 50 years, which have ranged from as much as 23 percent lower (in 1969) to

as much as 23 percent higher (in 1982) than prices observed in 2010.[351]

c. State or Regional Impacts

Comment: Multiple commenters expressed concern over the impact of the rule on electricity prices and reliability in specific states or regions. These commenters were concerned that these impacts would adversely affect specific industries such as construction and manufacturing. One commenter suggested the EPA consider regional differences that will impact system reliability and costs, such as the increased impacts on regions relying heavily on coal and oil and encourages cooperation between the EPA and state and federal energy and environmental regulators.

Response: The Agency has studied possible impacts on resource adequacy as a result of this rule, and has determined that these impacts should not be significant. Furthermore, industry, along with relevant federal agencies, has the tools needed to address any reliability concerns. The Agency has prepared an updated feasibility TSD in support of the final rule, which is in the docket for this rulemaking.[352] The Agency has considered impacts on a regional basis as part of its overall analyses done using the IPM; these results are documented in the RIA for the rule and in the feasibility TSD.

The EPA's analysis shows that retail electricity price increases will not fall disproportionately on a

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[351] EIA Annual Energy Outlook 2010 annual total electricity prices from 1960 to 2010, Table 8–10.

[352] *See* "An Assessment of the Feasibility of Retrofits for the Mercury and Air Toxics Standards Rule" in the docket.

specific region. In fact, those regions experiencing the largest change in prices are projected to have retail electricity prices below the national average both in the absence of MATS and after the implementation of MATS. In Chapter 3 of the RIA, the EPA presents retail electricity prices by region in 2015, for both the base case and MATS policy case. The six regions that are projected to have retail electricity prices above the national average price in 2015 in the absence of MATS are projected to have increases that are below the national average increase following the implementation of MATS. Those regions that have projected retail electricity price increases that are above the national average are all projected to have retail electricity prices below the national average in the absence of MATS.

Comment: A commenter quoted National Mining Association statistics showing coal is responsible for $65.738 billion in annual economic activity, produces 1,798,800 jobs and $36.345 billion in annual labor income. The commenter reports that regions such as Appalachia, the Midwest and Rocky Mountain West will be significantly affected by the proposed rule, including increased unemployment. Other commenters stated that communities near existing coal-fired generation units will be especially hard-hit if the plants are permanently retired. The communities will suffer from job loss and diminished tax revenue.

Response: The Agency's analysis, as found in the RIA, shows that impacts to these regions are mixed. For Appalachia, coal production is projected to fall by 6 percent in 2015, while the Western coal producing region will experience a decrease of 3 percent in production in 2015. The Interior region is projected to

see a 9 percent increase in production. Retail electricity prices are expected to increase by 1.3 percent to 6.3 percent in various parts of the country in 2015. Also, the estimated number of early retirements according to the Agency that may result from this rule is 4.7 GW in 2015, or less than 2 percent of all U.S. coal-fired capacity in that year. Thus, there may be some negative impacts from this rule in some regions, but these same regions will also experience some of the benefits, such as reduced premature mortality from less exposure to $PM_{2.5}$ emissions as shown in Chapter 5 of the RIA. As discussed previously, the EPA's analysis shows that retail electricity price increases will not fall disproportionately on a specific region. In fact, those regions experiencing the largest change in prices are projected to have retail electricity prices below the national average both in the absence of MATS and after the implementation of MATS.

The results of the EPA's employment analysis, found in Chapter 6 of the RIA, indicate that the final MATS has the potential to provide significant short-term employment opportunities, primarily driven by the high demand for new pollution control equipment. While the employment gains related to the new pollution controls are likely to be tempered by some losses due to certain coal retirements, some of these workers who lose their jobs due to plant retirements could find replacement employment operating the new pollution controls at nearby units. Finally, job losses due to reduced coal demand are expected to be offset by job gains due to increased natural gas demand, resulting in a small positive net change in employment due to fuel demand changes.

While shifts in employment are difficult for those directly affected, and the Agency remains concerned about the challenges job shifts can bring to the individuals affected, Bureau of Labor Statistics data indicate that compliance with pollution control requirements is a relatively very small contributor to overall employment shifts in the U.S. economy. Specifically, the main cause of mass layoffs over the last four years according to 2007 to 2011 Bureau of Labor Statistics data is "lack of business demand," accounting for over 40 percent of the layoffs reported by industry. In contrast, all types of regulatory actions (including health, safety, and environmental) by all levels of government (Federal, State, local) combined were cited as the primary factor in only 0.2 percent of mass layoffs over the same period.[353]

d. Retirements of Coal-Fired EGUs and Shutdowns

Comment: A commenter discussed the economic factors behind EGU retirements. These factors include the cost of alternative generation using natural gas, the cost of implementing demand response measures that can be bid into capacity markets, and the cost of continuing to generate power from an existing unit. The commenter states that regardless of the costs associated with the Toxics Rule and other EPA electric power industry regulations, some power plants were already economically unsustainable. The commenter quotes M.J. Bradley, who points out, "[o]f the 122 coal units in PJM with capacity less than or equal to 200 MW, 35 failed to recover their avoidable

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[353] U.S. Bureau of Labor Statistics, 2011. Extended Mass Layoffs in 2010. *http://www.bls.gov/mls/mlsreport1038.pdf.*

costs and another 52 were close to not recovering those costs. Therefore, in PJM * * * in addition to approximately 10 GW of coal generation that has or will be retired during the 7 years from 2004 to 2011, another 11 GW faces a troubling economic outlook." The commenter provides confirmation of this by the most recent PJM capacity auction, where approximately 6.9 fewer GW of coal-fired capacity cleared the auction (1.85 fewer GW were offered) as compared with the prior year's auction, and an additional 4.836 GW of new demand response (energy efficiency) resources cleared the auction. Thus, the commenter states, some claims linking retirements to the MATS are overstated and misleading. The commenter gives the example of the American Electric Power attempt to link its planned plant closures to the MATS, but those plants already are slated to either close or to upgrade controls to comply with existing laws. The commenter goes on to quote three independent studies that support the finding that over 50 percent of the fleet is equipped with scrubbers and the number will increase to nearly $^{2}/_{3}$ by 2015.

Response: The EPA agrees with the findings of the independent studies mentioned by the commenter.

e. Impacts on Mining

Comment: Multiple commenters mention the proposed rule's impact on mining. One commenter mentioned increasing energy costs for the U.S. mining industry, resulting in fewer projects and associated jobs, as well as increasing dependence on foreign mineral resources. Commenters see mining impacts being disproportionally large for lignite mines, which are dependent on their co-located lignite-fired power plants. The commenters state that if the plant closes,

there is no market for the lignite and the mine will also close, displacing plant workers. These impacts are largest in Texas, the largest coal consuming state and fifth largest coal producing state, as well as a deregulated electricity market. One commenter pointed out that the Texas coal market provided a buffer against natural gas price volatility and in particular believes the proposed rule does not take into account the emission reductions already achieved by industry in general and their company in particular. A commenter stated that impacts will be magnified in Texas, since it is the largest coal consuming state and mines lignite. A commenter indicated they believe it is unclear the extent to which EPA includes the impacts on the mining industry that will result from this rule.

Response: The Agency presents impacts on the coal mining sector from this rule in the RIA. Given the modest increase in coal and other energy costs associated with the rule, the Agency does not expect widespread impacts on coal mining. The Agency's modeling accounts for all emission controls and programs installed and/or implemented up through December 2010, including those in Texas.

f. Flexible Regulations

Comment: Several commenters expressed concern over the potential impacts of the regulation and believe that the requirements should be more flexible in order to mitigate these impacts.

Response: The EPA believes the requirements of the final rule have been made as flexible as possible consistent with the CAA. The final rule allows some flexibility, including allowing averaging across units

in the same subcategory at a facility, allowing for an option of an input or output standard for existing units, and allowing for alternative compliance options (*e.g.*, for coal, filterable PM or total non-mercury metallic HAP or individual HAP metals). In addition, the Agency is not prescribing specific technologies as part of this final rule, but instead requiring emissions limitations be met. This approach allows the industry to find the most cost-effective approach to meeting the requirements while ensuring considerable public health benefits.

g. Temporary vs. Permanent Jobs

Comment: A commenter expressed disagreement with the EPA prediction of new jobs created, because the commenter believes far more plants will shut down than the EPA predicts, resulting in higher job losses. The commenter also pointed out that while jobs running power plants are permanent, the jobs predicted to be created by the proposed rule are short term construction jobs, and will all occur in the same short timeframe for compliance. The commenter also stated that the EPA estimate does not include the opportunity cost of lost construction jobs due to new power plants that will not be constructed due to the proposed rules.

Response: The Agency believes that the employment impacts of the final rule will be small, as has been the case historically with regards to environmental regulation. The Agency does provide an estimate of the long-term employment impacts to the electric power sector in the RIA for the rule, and that estimate shows a range of impacts from 15,000 net jobs lost to 30,000 net jobs gained (all annual), but also recognizes important limitations to these esti-

mates. The Agency's estimate of impacts to short-term jobs, including those in construction, accounts for both losses and gains that result from the rule. This is shown in Chapter 6 of the RIA.

Comment: Commenters believe that installation of new pollution controls would be a job-growth opportunity in their states because money spent on controls for power plants creates high-quality jobs in steel, cement and other materials, as well as in the assembling of the equipment as well as installing and operating it. A commenter shares the Alabama Fisheries Association estimate that the water-based recreation industry brings in over $1 billion per year to the state's economy though the state ranks third for imperiled fish with 61 bodies of water cited for Hg contamination. The commenter believes the HAP accumulating in the waterways threatens the industry with permanent job-losses and lost revenue.

Response: The Agency agrees with the commenter that the reduction in HAP that will take place as a result of the rule over time will help to improve waterways in Alabama and thus help the water-based recreation in that state. More information on the benefits of Hg and other HAP reductions can be found in Chapter 4 of the RIA for the rule. The Agency also agrees with the commenter that the addition of control equipment for EGUs may stimulate employment in a variety of industries.

h. Natural Gas

Comment: A commenter states that natural gas use is only an option in places where infrastructure exists to supply sufficient natural gas to the EGU and other local needs and reports that year-round re-

liable gas delivery is rare due to requirements to meet the other needs. The commenter says that gas interruptions are prevalent in the winter, but can happen year-round, and the costs of establishing a natural gas line to a power plant can be tens of millions of dollars or more, and moving a plant to a gas source can take many years. The commenter describes the options for a Norwalk Harbor plant, and explains that the modifications are costly and difficult even before considering the modifications needed to alter the boiler and fuel supply system to allow natural gas combustion.

Response: The final rule does not prescribe either pollution control technologies to be used, nor does it dictate the types of fuels that should be burned. The requirements of the final rule are designed to allow industry to find the most cost-effective approach to addressing harmful emissions that are covered by this action. The Agency believes that cost-effective technologies exist today and have been deployed on many power plants, and utilities will be able to find intelligent solutions to address harmful emissions. The EPA has provided supporting information as part of the preamble and RIA for this rule, along with the feasibility TSD, which demonstrate the availability and performance of technologies to meet the requirements of the final rule.

Comment: A commenter discusses the factors that could lead to higher natural gas prices not currently reflected in the EPA impact projections, including industrial load and demand not rebounding to 2008 levels and the influence of liquefied natural gas exports. The commenter asks that the EPA address a

variety of factors related to its natural gas assumptions.

Response: The Agency has fully documented its assumptions and framework for modeling natural gas in IPM for both the proposed and final MATS. This information can be found in Chapter 10 of the IPM documentation (*http://www.epa.gov/airmarkets/progsregs/epa-ipm/docs/v410/Chapter10.pdf*). The documentation provides a thorough overview of the natural gas module, describes the very detailed process-engineering model and data sources used to characterize North American conventional, unconventional, and frontier natural gas resources and reserves and to derive all the cost components incurred in bringing natural gas from the ground to the pipeline. Also documented are the resource constraints, liquefied natural gas (LNG), demand side issues, the natural gas pipeline network and capacity, procedures used to capture pipeline transportation costs, natural gas storage, oil and natural gas liquids (NGL) assumptions, and key gas market parameters.

i. Compliance Timeline and General Timeline

Comment: A commenter states that the proposed rule will require costs be passed on to consumers, meaning state public utility commissions will be flooded with requests for rate increases from utilities trying to recover expenditures. The short deadline will also result in a large number of extension requests made to state permitting authorities, further burdening them.

Response: The compliance date for this rule for existing sources will be 3 years and 60 days after publication of the final rule in the **Federal Register**, or

approximately March 2015. Thus, there will be some time before the impacts of this rule such as any increase in retail electricity prices become a concern. It also should be noted that increases in retail electricity prices will be 3.1 percent on average in 2015, with a range regionally from 1.3 percent to 6.3 percent.

Comment: A commenter reports that they will need to install add-on pollution controls to meet the proposed emission standards as well as implement other physical or operational changes. The commenter expresses concern about the number of pre-construction steps that would be required, as well as the new construction activities and the challenges of scheduling sequence relative to interconnections and other tie-in considerations involved in compliance.

Response: The Agency has addressed concerns with the feasibility and timing of control installations in its report on the subject (*see* feasibility TSD contained in the docket for this rule).

Comment: Multiple commenters do not believe that labor availability will constrain control installation in the required timeframe and cites an Institute of Clean Air Companies (ICAC) response that it will not for these reasons:

1. The power sector has demonstrated ability to install large number of systems in short time period;

2. The majority of coal plans have installed control systems already;

3. Fewer resource and labor-intensive control options being used for compliance; and

4. End users have utilized cost reducing and implementation efficiency strategies for efficient deployment of technologies.

Another commenter states that a wide range of technical and economically feasible practices and technologies are available currently to meet the emission limits and are in use around the country.

Response: These comments are generally consistent with the conclusions of the Agency's analyses on feasibility of control installations for this rule as found in the feasibility TSD in the docket for this rulemaking.

j. Burden Outweighs Environmental Gain

Comment: Several commenters state that the EPA has no data relating to benefits from reducing non-mercury HAP, so the costs of the proposed rule exceed the HAP benefits by 29,000 times. One commenter states that the impact analysis was largely focused on Hg with little support for other HAP reductions and failed to provide account of true costs and benefits.

Response: While we are not able to monetize the benefits from reductions of non-mercury HAP that will take place, these important effects are discussed qualitatively in Chapter 4 of the RIA. The quantified benefits of this rule include the reductions in non-HAP emissions such as SO_2 and $PM_{2.5}$ that will occur as a co-benefit of this rule as modeled by EPA. The total benefits are estimated to outweigh the total annual costs of the rule by a margin of either 3 to 1 or 9 to 1, depending on the benefits estimate and discount rate used. These reductions are credible and are considerable in size. The estimates of these benefits re-

flect the latest scientific understanding on the subject. More information on the estimates and the methodology for their preparation can be found in the RIA for the rule.

Comment: Several commenters consider the proposed rule to be the most expensive clean air rule ever. They point out the estimated $10.9 billion annual cost in 2015 and approximate 1,200 existing coal-fired EGUs affected, both of which were estimated by the EPA. Commenters believe the EPA's estimates are incorrect and the true cost will be far more, due to cumulative effects of all proposed power sector rules, and indirect costs from job losses, reduced productivity and competitiveness resulting from electricity costs. They ask the EPA to keep these high costs in mind when evaluating impacts of the proposed rule and consider the costs with respect to the benefits. One commenter requests that the EPA explain how its approach utilized "the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible" and includes analyses by EIA, EEI, NERC, NERA, Credit Suisse, ICF, and Burns & McDonnell.

Response: As noted earlier, the Agency did not prepare a cumulative impact analysis to accompany the rule for the following reasons: (1) The various EO requirements that the Agency must comply with require us to estimate impacts specific to this rule; (2) decisionmakers and the public need to know the impacts specific to a particular rule in order to judge the merits of the regulation; and (3) estimates specific to a particular rule are more transparent than those from a cumulative impact analysis. A cumulative impact analysis lumps several regulations together

and can potentially mask a high-cost/low benefit regulation among other rules that may have large net benefits. By analyzing each regulation separately, EPA makes clear statements about the impacts, costs, and benefits that are estimated as a result of this particular regulation.

This does not, however, mean EPA has failed to incorporate these regulations into this analysis. The inclusion of CSAPR and other regulatory actions (including federal, state, and local actions) in the IPM base case reflects the level of controls that are likely to be in place in response to other requirements apart from MATS. This base case provides meaningful projections of how the power sector will respond to the cumulative regulatory requirements for air emissions, while isolating the incremental impacts of MATS. These results are presented in Chapter 3 of the RIA.

Additionally, the Agency does reflect on the cumulative impacts of our regulations. In March 2011, EPA issued the Second Clean Air Act Prospective Report which assessed the benefits and costs of regulations pursuant to the 1990 Clean Air Act Amendments. The study examines the cumulative impact of these regulations (found at *http://www.epa.gov/air/sect812/feb11/summaryreport.pdf*). As shown in the report, the direct benefits from the 1990 Clean Air Act Amendments are estimated to reach almost $2 trillion for the year 2020, a figure that dwarfs the direct costs of implementation ($65 billion). The full report is at *http://www.epa.gov/air/sect812/prospective2.html.*

The direct benefits of the 1990 Clean Air Act Amendments and associated programs are estimated

to significantly exceed their direct costs, which means economic welfare and quality of life for Americans were improved by passage of the 1990 Amendments. The wide margin by which benefits are estimated to exceed costs, combined with extensive uncertainty analysis, suggest it is very unlikely this result would be reversed using any reasonable alternative assumptions or methods. The analysis presented in the RIA for the current regulation uses a similar methodology.

The techniques employed by the Agency for generating benefits and costs, and consider the most recent and complete data available to the Agency. The EPA recognizes that the analyses have caveats and limitations, and we discuss our analyses and their caveats and limitations in the RIA for the rule, as well as in the benefits section of the preamble. The Agency has also revised the cost analyses for the final rule to reflect data received in public comments on the proposed rule, and costs are lower than when the rule was proposed.

k. Impact on State Regulators

Comment: Several commenters expressed concern over the burden imposed on state regulatory agencies by the rule.

Response: The Agency has estimated the costs of implementation of the rule to states that own EGUs affected by the rule, and has included this analysis in the RIA. The Agency has updated this analysis for the final rule and it is included in the RIA. While the EPA has not prepared an analysis of the impacts of the rule on state programs, the Agency does not believe the rule will be unduly burdensome to the state

regulatory agencies. The EPA works closely with state regulatory authorities to ensure that the rules are implemented properly, and the Agency will continue to do so in support of this final rule.

Comment: A commenter states that the reductions in SO_2 and $PM_{2.5}$ required by the proposed rule will assist state and local air pollution control agencies to meet health-based air quality standards, reduce haze and improve visibility. The commenter points out that substantial reduction in emissions made by the very large sources under the proposed rule will lead to fewer pollution controls needed at smaller sources to meet health-based ambient air requirements. This is a far more cost-effective approach than controls at smaller facilities and is the lowest cost path to improved public health and a cleaner environment.

Response: The EPA acknowledges that the HAP standards in this final rule will lead to considerable co-benefit reductions in PM and SO_2.

1. Miscellaneous

Comment: A few commenters discussed the impact of the rule on the federal budget deficit. One commenter points out that the proposed rule will affect the federal budget in two ways:

1. Direct compliance costs to electric generating units (EGUs) owned by federal agencies; and

2. Pass-through compliance costs paid in the form of higher prices for electricity purchased by federal agencies.

Response: The Agency estimates the direct compliance costs to EGUs that are federally owned as part of the overall cost analysis completed for the proposal

and disclosed in the RIA for the rule. The Agency does not provide an estimate of the impact on federal agencies from higher electricity prices associated with the rule, however. This type of analysis is not required under EO 12866 and statutory requirements.

[CONTENT OMITTED]

XII. Impacts of the Final Rule

The EPA anticipates significant public health and environmental benefits from the rule as a direct result of the substantial reduction in the emissions of several pollutants, including SO_2, Hg, acid gases and fine particles and metals. For example, exposure to Hg can damage the developing nervous system, which can impair children's ability to think and learn, and fine particles can cause adverse cardiovascular effects. Further, reducing Hg deposition to ecosystems will benefit wildlife including fish, birds, and mammals. Fish and fish-eating birds, such as the common loon, and mammals suffer reproductive, survival, and behavioral impairments due to mercury exposure. These effects have also been observed in insect-eating and wading birds, including egrets and white ibis. Reductions of emissions targeted by this rule also will slow acidification and eutrophication of water bodies.

Additionally, the EPA anticipates significant non-health, non-ecological benefits from this rule. The fine particle and SO_2 emission reductions achieved by this rule will improve visibility, which is especially important for our national parks. Emissions reductions from this rule will also avoid an estimated $360 million (in $2007) of climate-related costs, such as agricultural productivity and property damage from increased flood risks.

A. What are the air impacts?

The EPA anticipates significant emission reductions under the final rule from coal-fired EGUs, which are of particular interest due to their share of total power sector emissions. In 2015, annual HCl

emissions are projected to be reduced by 88 percent, Hg emissions reduced by 75 percent, and $PM_{2.5}$ emissions reduced by 19 percent from coal-fired EGUs greater than 25 MW. In addition, the EPA projects SO_2 emission reductions of 41 percent, and annual CO_2 reductions of 1 percent from coal-fired EGUs greater than 25 MW by 2015, relative to the base case. *See* Table 7.

TABLE 7—SUMMARY OF EMISSION REDUCTIONS FROM COAL-FIRED EGUS GREATER THAN 25 MW (TPY)

	SO_2 (million tons)	NOx (million tons)	Mercury (tons)	HCl (thousand tons)	$PM_{2.5}$ (thousand tons)	CO_2 (million metric tonnes)
Base Case	3.3	1.7	27	45	270	1,906
MATS	1.9	1.7	7	6	218	1,882
Change	- 1.4	0.0	- 20	- 40	- 52	- 23

Note: Numbers may not add due to rounding.

The reductions in this table do not account for reductions in other HAP which will occur as a result of this rule. For instance, the fine particulate reductions presented above only partly reflect reductions in many heavy metal particulates, and the HCl reductions above only partly reflect reductions of all acid gases. This rule will also result in additional HAP reductions from oil-fired EGUs, which are covered by the rule but are not included in the EPA's analysis of emission reductions.

B. What are the energy impacts?

The EPA projects that approximately 4.7 GW of coal-fired generation (less than 2 percent of all coal-fired capacity and 0.5 percent of total generation capacity in 2015) may be uneconomic to maintain and may be removed from operation by 2015. These units are predominantly smaller, less frequently used, and are dispersed throughout the country. If current forecasts of either natural gas prices or electricity demand were revised in the future to be higher, that would create a greater incentive to make further investments in these facilities and keep these units operational.

The final rule has other important energy market implications. Average nationwide retail electricity prices are projected to increase in the contiguous U.S. by 3.1 percent in 2015. The average delivered coal price is projected to increase by less than 2 percent in 2015 as a result of shifts within and across coal types. The EPA also projects that electric power sector-delivered natural gas prices will increase by between 0.3 and 0.6 percent over the 2015 to 2030 timeframe, on average, and that natural gas use for electricity generation will increase by less than 200 billion cubic

feet (BCF) in 2015. These impacts are well within the range of price variability that is regularly experienced in natural gas markets. Finally, the EPA projects coal production for use by the power sector, a large component of total coal production, will decrease by 10 million tons in 2015 from base case levels, which is about 1 percent of total coal produced for the electric power sector in that year.

C. What are the cost impacts?

The power industry's "compliance costs" are represented in this analysis as the change in electric power generation costs between the base case and policy case in which the sector pursues pollution control approaches to meet the MATS emission standards. In simple terms, these costs are the resource costs of direct power industry expenditures to comply with the EPA's requirements.

The EPA projects that the annual incremental compliance cost of MATS is $9.6 billion in 2015 ($2007). The annualized incremental cost is the projected additional cost of complying with the rule in the year analyzed, and includes the amortized cost of capital investment and the ongoing costs of operating additional pollution controls, needed new capacity, shifts between or amongst various fuels, and other actions associated with compliance.

The total incremental compliance cost includes compliance costs modeled in IPM of $9.4 billion, costs modeled outside of IPM for oil-fired EGUs of $56 million, and monitoring, reporting, and recordkeeping costs of $158 million.

D. What are the economic impacts?

For this final rule, EPA analyzed the costs using the IPM. The IPM is a dynamic linear programming model that can be used to examine the economic impacts of air pollution control policies for a variety of HAP and other pollutants throughout the contiguous U.S. for the entire power system.

Documentation for IPM can be found in the docket for this rulemaking or at *http://www.epa.gov/airmarkets/progsregs/epa-ipm/index.html.*

The EPA performed a screening analysis for impacts on small entities by comparing compliance costs to sales/revenues (e.g., sales and revenue tests). The EPA's analysis can be found in Chapter 7 of the RIA for this rule. The EPA has also prepared a Final Regulatory Flexibility Analysis (FRFA) that discusses alternative regulatory or policy options that minimize the rule's small entity impacts.

Although a stand-alone analysis of employment impacts is not included in a standard cost-benefit analysis, the current economic climate has led to heightened concerns about potential job impacts. Executive Order 13563 specifically states that our "regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation" (emphasis added).

Under conditions of full employment, it is conventional to assume that regulations will merely shift jobs from one sector to another, without having a material effect on employment levels. Potential employment effects are of greater concern in the current

economic climate, with high levels of employment, because of the risk that displaced workers may not find alternative jobs. In addition, regulations that result in firms hiring workers, in order to ensure compliance, may have a positive effect on employment.

During sustained periods of excess unemployment, the opportunity cost of labor required by regulated sectors to bring their facilities into compliance with an environmental regulation may be lower than it would be during a period of full employment (particularly if regulated industries employ otherwise idled labor to design, fabricate, or install the pollution control equipment required under this final rule). Consistent with EO 13563, the EPA includes estimates of job impacts associated with the final rule. In the electricity sector, the EPA estimates that the net employment effect will range from – 15,000 to +30,000 jobs, with a central estimate of +8,000. The EPA also presents an estimate of short-term employment effects as a result of increased demand for pollution control equipment.

The results of this analysis, found in Chapter 6 of the RIA, indicate that the final rule has the potential to provide increases in short-term employment in the environmental industry, primarily driven by the high demand for new pollution control equipment. Overall, the results suggest that the final rule could support a net of roughly 46,000 job years[355] in direct employment impacts in 2015.

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[355] Numbers of job years are not the same as numbers of individual jobs, but represents the amount of work that can be performed by the equivalent of one full-time individual for a

There are other employment effects that cannot be estimated quantitatively at this time. The employment gains related to the new pollution controls are likely to be tempered by some losses due to certain coal retirements. On the other hand, some of those workers who lose their jobs due to plant retirements could find alternative employment operating the replacement electricity generating equipment or new pollution controls at nearby units. Finally, job losses due to reduced coal demand may be offset by job gains due to increased natural gas demand, potentially resulting in a positive net change in employment due to fuel demand changes.

The basic approach to estimate these employment impacts involved using IPM projections from the final rule analysis, in particular the amount of existing coal-fired capacity that is projected to be retrofit with pollution control technologies. These data, along with data on labor and resource needs of new pollution controls and labor productivity from engineering studies and secondary sources, are used to estimate employment impacts for the pollution control industry in 2015. For more information, please refer to Chapter 6 and appendix 6B in the RIA.

The EPA relied on Morgenstern, *et al.*, (2002), to identify three economic mechanisms by which pollution abatement activities can influence jobs in the regulated sector separately from the short-term employment effects:

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year (or FTE). For example, 25 job years may be equivalent to five full-time workers for five years, 25 full-time workers for one year, or one full-time worker for 25 years.

- Higher production costs raise market prices, higher prices reduce consumption, and employment within an industry falls ("demand effect");
- Pollution abatement activities require additional labor services to produce the same level of output ("cost effect"); and
- Post-regulation production technologies may be more or less labor intensive (*i.e.*, more/less labor is required per dollar of output) ("factor-shift effect").

Using plant-level Census information between the years 1979 and 1991, Morgenstern, *et al.*, estimate the size of each effect for four polluting and regulated industries (petroleum, plastic material, pulp and paper, and steel). On average across the four industries, each additional $1 million spent on pollution abatement results in a small net increase of 1.55 jobs; the estimated effect is not a statistically different from zero. As a result, the authors conclude that increases in pollution abatement expenditures may increase employment in the relevant sectors and do not necessarily cause economically significant employment changes. The conclusion is similar to that of Berman and Bui (2001) who found that increased air quality regulation in Los Angeles did not cause large employment changes.[356] For more information, please refer to Chapter 6 of the RIA for this final rule.[357]

In the directly affected sector, the EPA estimates that the net employment effect will range from —

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[356] For alternative views in economic journals, see Henderson (1996) and Greenstone (2002).

[357] It should be noted that if more labor must be used to produce a given amount of output, then this implies a decrease in labor productivity. A decrease in labor productivity will cause a short-run aggregate supply curve to shift to the left, and businesses will produce less, all other things being equal.

15,000 to +30,000 jobs, with a central estimate of +8,000. The ranges of job effects for the electricity sector, as calculated using the Morgenstern, *et al.*, approach are listed in Table 8.

TABLE 8—RANGE OF JOB EFFECTS FOR THE ELECTRICITY SECTOR

	Estimates using Morgenstern, *et al.*, (2001)			
	Demand effect	Cost effect	Factor shift effect	Net effect
Change in Full-Time Jobs per Million Dollars of Environmental Expenditure[a].	– 3.56	2.42	2.68	1.55.
Standard Error	2.03	0.83	1.35	2.24.
EPA estimate for Final Rule[b]	– 39,000 to +2,000	+4,000 to +21,000	+200 to +27,000	– 15,000 to +30,000.

a Expressed in 1987 dollars. *See* footnote a from Table 6–2 of the RIA for inflation adjustment factor used in the analysis.

b According to the 2007 Economic Census, the electric power generation, transmission and distribution sector (NAICS 2211) had approximately 510,000 paid employees.

The EPA recognizes there may be other job effects that are not considered in the Morgenstern, *et al.*, study. Although EPA has considered some economy-wide changes, we do not have sufficient information to quantify other job effects associated with this rule.

E. What are the benefits of this final rule?

1. Benefits of Reducing HAP Emissions

a. Human Health and Environmental Effects Due to Exposure to MeHg. In this section, we provide a qualitative description of human health and environmental effects due to exposure to MeHg. The NAS Study (NRC, 2000) provides a thorough review of the effects of MeHg on human health. Many of the peer-reviewed articles cited in this section are publications originally cited in the NAS Study. In addition, the EPA has conducted literature searches to obtain other related and more recent publications to complement the material summarized by the NAS in 2000.

b. Neurologic Effects of Exposure to MeHg. In its review of the literature, the NAS found neurodevelopmental effects to be the most sensitive and best documented endpoints and concluded that they are appropriate for establishing an RfD (NRC, 2000); in particular NAS supported the use of results from neurobehavioral or neuropsychological tests. The NAS Study (NRC, 2000) noted that studies in animals reported sensory effects as well as effects on brain development and memory functions and support the conclusions based on epidemiology studies. The NAS noted that their recommended neurodevelopmental endpoints for an RfD are associated with the ability of children to learn and to succeed in school. They concluded the following: "The popula-

tion at highest risk is the children of women who consumed large amounts of fish and seafood during pregnancy. The committee concludes that the risk to that population is likely to be sufficient to result in an increase in the number of children who have to struggle to keep up in school."

c. Cardiovascular Impacts of Exposure to MeHg. The NAS summarized data on cardiovascular effects available up to 2000. Based on these and other studies, the NAS Study concluded that "Although the data base is not as extensive for cardiovascular effects as it is for other end points (*i.e.*, neurologic effects) the cardiovascular system appears to be a target for MeHg toxicity in humans and animals." The report also stated that "additional studies are needed to better characterize the effect of MeHg exposure on blood pressure and cardiovascular function at various stages of life."

Additional cardiovascular studies have been published since 2000. The EPA did not develop a quantitative dose-response assessment for cardiovascular effects associated with MeHg exposures, as there is no consensus among scientists on the dose-response functions for these effects. In addition, there is inconsistency among available studies as to the association between MeHg exposure and various cardiovascular system effects. The pharmacokinetics of some of the exposure measures (such as toenail Hg levels) are not well understood. The studies have not yet received the review and scrutiny of the more well-established neurotoxicity data base.

d. Genotoxic Effects of Exposure to MeHg. The Mercury Study noted that MeHg is not a potent mutagen but is capable of causing chromosomal damage

in a number of experimental systems. The NAS Study indicated that evidence that human exposure to MeHg causes genetic damage is inconclusive; they note that some earlier studies showing chromosomal damage in lymphocytes may not have controlled sufficiently for potential confounders. One study of adults living in the Tapajós River region in Brazil (Amorim *et al.*, 2000) reported a direct relationship between MeHg concentration in hair and DNA damage in lymphocytes, as well as effects on chromosomes. Long-term MeHg exposures in this population were believed to occur through consumption of fish, suggesting that genotoxic effects (largely chromosomal aberrations) may result from dietary, chronic MeHg exposures similar to and above those seen in the populations studied in the Faroe Islands and Republic of Seychelles.

e. Immunotoxic Effects to Exposure to MeHg. Although exposure to some forms of Hg can result in a decrease in immune activity or an autoimmune response (ATSDR, 1999), evidence for immunotoxic effects of MeHg is limited (NRC, 2000).

f. Other Hg-Related Human Toxicity Data. Based on limited human and animal data, MeHg is classified as a "possible" human carcinogen by the International Agency for Research on Cancer (IARC, 1994) and in IRIS (USEPA, 2002). The existing evidence supporting the possibility of carcinogenic effects in humans from low-dose chronic exposures is tenuous. Multiple human epidemiological studies have found no significant association between Hg exposure and overall cancer incidence, although a few studies have shown an association between Hg expo-

sure and specific types of cancer incidence (*e.g.*, acute leukemia and liver cancer) (NAS, 2000).

Some evidence of reproductive and renal toxicity in humans from MeHg exposure exists. However, overall, human data regarding reproductive, renal, and hematological toxicity from MeHg are very limited and are based on studies of the two high-dose poisoning episodes in Iraq and Japan or animal data, rather than epidemiological studies of chronic exposures at the levels of interest in this analysis.

g. Ecological Effects of Hg. Deposition of Hg to watersheds can also have an impact on ecosystems and wildlife. Mercury contamination is present in all environmental media, with aquatic systems experiencing the greatest exposures due to bioaccumulation. Bioaccumulation refers to the net uptake of a contaminant from all possible pathways and includes the accumulation that may occur by direct exposure to contaminated media as well as uptake from food.

A review of the literature on effects of Hg on fish[358] reports results for numerous species including trout, bass (large and smallmouth), northern pike, carp, walleye, salmon, and others from laboratory and field studies. The effects of MeHg in fish are reproductive in nature. Although we cannot determine at this time whether these reproductive deficits are affecting fish populations across the U.S. it should be noted that it would seem reasonable that over time reproductive deficits would have an effect on populations.

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[358] Crump, KL, and Trudeau, VL. Mercury-induced reproductive impairment in fish. Environmental Toxicology and Chemistry. Vol. 28, No. 5, 2009.

Mercury also affects avian species. In previous reports [359] much of the focus has been on large piscivorous species, in particular the common loon. According to Evers, *et al.*, significant adverse effects from Hg on breeding loons have been found to occur, including behavioral (reduced nest-sitting), physiological (flight feather asymmetry) and reproductive (chicks fledged/territorial pair) effects and reduced survival.[360] Additionally, Evers, *et al.*, (*see* footnote 5), believe that the weight of evidence indicates that population-level effects occur in parts of Maine and New Hampshire, and potentially in broad areas of the loon's range.

Recently, attention has turned to other piscivorous species such as the white ibis and great snowy egret. These wading birds have a very wide diet including crayfish, crabs, snails, insects and frogs. White ibis

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[359] U.S. Environmental Protection Agency (EPA). 1997. Mercury Study Report to Congress. Volume V: Health Effects of Mercury and Mercury Compounds. EPA–452/R–97–007. U.S. EPA Office of Air Quality Planning and Standards, and Office of Research and Development; U.S. Environmental Protection Agency (U.S. EPA). 2005. *Regulatory Impact Analysis of the Final Clean Air Mercury Rule.* Research Triangle Park, NC., March; EPA report no. EPA–452/R–05–003. Available on the Internet at *http://www.epa.gov/ttn/ecas/regdata/RIAs/mercury_ria_final.pdf.*

[360] Evers, DC, Savoy, LJ, DeSorbo, CR, Yates, DE, Hanson, W, Taylor, KM, Siegel, LS, Cooley, JH, Jr., Bank, MS, Major, A, Munney, K, Mower, BF, Vogel, HS, Schoch, N, Pokras, M, Goodale, MW, Fair, J. Adverse effects from environmental mercury loads on breeding common loons. Ecotoxicology. 17:69–81, 2008; Mitro, MG, Evers, DC, Meyer, MW, and Piper, WH. Common loon survival rates and mercury in New England and Wisconsin. Journal of Wildlife Management. 72(3): 665–673, 2008.

have been observed to have decreased foraging efficiency[361] and have been shown to exhibit decreased reproductive success and altered pair behavior.[362] In egrets, Hg has been implicated in the decline of the species in south Florida,[363] and Hoffman[364] has shown that egrets exhibit liver and possibly kidney effects. Although ibises and egrets are most abundant in coastal areas and these studies were conducted in south Florida and Nevada, the ranges of ibises and egrets extend to a large portion of the U.S.

Insectivorous birds have also been shown to suffer adverse effects due to Hg exposure. Songbirds such as Bicknell's thrush, tree swallows, and the great tit have shown reduced reproduction, survival, and changes in singing behavior. Exposed tree swallows produced fewer fledglings,[365] had lower survival

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[361] Adams, EM, and Frederick, PC. Effects of methylmercury and spatial complexity on foraging behavior and foraging efficiency in juvenile white ibises (Eudocimus albus). Environmental Toxicology and Chemistry. Vol 27, No. 8, 2008.

[362] Frederick, P, and Jayasena, N. Altered pairing behavior and reproductive success in white ibises exposed to environmentally relevant concentrations of methylmercury. Proceedings of The Royal Society B. doi: 10–1098, 2010.

[363] Sepulveda, MS, Frederick, PC, Spalding, MG, and Williams, GE, Jr. Mercury contamination in free-ranging great egret nestlings (Ardea albus) from southern Florida, USA. Environmental Toxicology and Chemistry. Vol. 18, No. 5, 1999.

[364] Hoffman, DJ, Henny, CJ, Hill, EF, Grover, RA, Kaiser, JL, Stebbins, KR. Mercury and drought along the lower Carson River, Nevada: III. Effects on blood and organ biochemistry and histopathology of snowy egrets and black-crowned night-herons on Lahontan Reservoir, 2002–2006. Journal of Toxicology and Environmental Health, Part A. 72:20, 1223–1241, 2009.

[365] Brasso, RL, and Cristol, DA. Effects of mercury exposure in the reproductive success of tree swallows (Tachycineta bicolor). Ecotoxicology. 17:133–141, 2008.

rates,[366] and had compromised immune competence.[367] The great tit has exhibited reduced singing behavior and smaller song repertoire in areas of high contamination.[368]

In mammals, adverse effects have been observed in mink and river otter, both fish eating species. For otter from Maine and Vermont, maximum concentrations of Hg in fur nearly equal or exceed a level associated with mortality and concentration in liver for mink in Massachusetts/Connecticut and the levels in fur from mink in Maine exceed concentrations associated with acute mortality.[369] Adverse sublethal effects may be associated with lower Hg concentrations and consequently may be more widespread than potential acute effects. These effects may include increased activity, poorer maze performance, abnormal startle reflex, and impaired escape and avoidance behavior.[370]

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[366] Hallinger, KK, Cornell, KL, Brasso, RL, and Cristol, DA. Mercury exposure and survival in free-living tree swallows (Tachycineta bicolor). Ecotoxicology. Doi: 10.1007/s10646–010–0554–4, 2010.

[367] Hawley, DM, Hallinger, KK, Cristol, DA. Compromised immune competence in free-living tree swallows exposed to mercury. Ecotoxicology. 18:499–503, 2009.

[368] Gorissen, L, Snoeijs, T, Van Duyse, E, and Eens, M. Heavy metal pollution affects dawn singing behavior in a small passerine bird. Oecologia. 145: 540–509, 2005.

[369] Yates, DE, Mayack, DT, Munney, K, Evers DC, Major, A, Kaur, T, and Taylor, RJ. Mercury levels in mink (Mustela vison) and river otter (Lonra canadensis) from northeastern North America. Ecotoxicology. 14, 263–274, 2005.

[370] Scheuhammer, AM, Meyer MW, Sandheinrich, MB, and Murray, MW. Effects of environmental methylmercury on the health of wild birds, mammals, and fish. Ambio. Vol.36, No.1, 2007.

h. Methodology for Partial Hg Benefits Estimation. The EPA has conducted a national-scale analysis of the benefits to recreational anglers of avoided IQ loss related to reductions of Hg emissions and subsequent deposition that will be achieved by this rule. Because the primary measurable health effect of concern—developmental neurological abnormalities in children—occurs as a result of in-utero exposures to Hg, the specific population of interest in this case is prenatally exposed children. To identify and estimate the size of this exposed population, the benefits analysis focused on pregnant women in freshwater recreational angler households. Estimating Hg exposures for this exposure pathway and population of interest requires three main components: (1) The size of the exposed population of interest (annual number of pregnant women in freshwater angler households during the year), (2) the average concentration of MeHg in noncommercial freshwater fish filets consumed, and (3) the average daily consumption rate of noncommercial freshwater fish. The Hg concentrations of fish in the waterbodies where the fish are caught are modeled using Mercury Maps to project the decline in concentrations due to the rule. To approximate the percentage of freshwater fishing trips (and exposed individuals) from each Census tract matched to each waterbody type, the EPA used state-level averages. These averages were calculated for each state, based on the portion of residents' freshwater fishing trips that are to each waterbody type, based on 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR) data.

Data from the 1994 National Survey on Recreation and the Environment (NSRE) were used to approxi-

mate the percentage of freshwater fishing trips (and exposed individuals) matched to different distances from anglers' residential location.

To determine an appropriate daily fish consumption rate for the analysis, the EPA conducted an extensive review of existing literature characterizing self-caught freshwater fish consumption. Based on this review, it was decided that the ingestion rates for recreational freshwater fishers, specified as "recommended" in the EPA's "Environmental Exposure Factors Handbook" (EPA, 1997), represented the most appropriate values to use in this analysis.

Estimating the IQ decrements in children that result from mothers' prenatal ingestion of Hg from fish required two steps. First, based on the estimated average daily maternal ingestion rate, the expected Hg concentration in the hair of exposed pregnant women was estimated. Second, to estimate the expected IQ decrement in offspring, the following dose-response relationship was developed based on the summary findings reported in Axelrad *et al.*, (2007).

The valuation approach used to assess monetary losses due to IQ decrements is based on an approach applied in previous EPA analyses (EPA, 2008). The approach expresses the potential loss to an affected individual resulting from IQ decrements in terms of foregone future earnings (net of changes in education costs) for that individual.

The estimate for "Present Value of Lifetime Earnings" is derived using earnings and labor force participation rate data from the Bureau of Labor Statistics 2006 Current Population Survey. Estimates of the average effect of a 1-point increase in IQ on lifetime

earnings range from a 1.76 percent increase (Schwartz, 1994) to a 2.379 percent increase (Salkever, 1995). The percentage increases in the two studies reflect both the direct impact of IQ on hourly wages and indirect effects on annual earnings as the result of additional schooling and increased labor force participation. The estimate for years of additional schooling is based on Schwartz (1994), who reports an increase of 0.131 years of schooling per IQ point.

In addition to this positive net effect on earnings, an increase in IQ is also assumed to have a positive effect on the amount of time spent in school and on associated costs. To incorporate (1) uncertainty regarding the size of the percentage change in future earnings and (2) different assumptions regarding the discount rate, the resulting value estimates for the average net loss per IQ point decrement are expressed as a range. Assuming a 3 percent discount rate, value IQ ranges from $8,013 (using the Schwartz estimates) to $11,859 (using the Salkever estimates) in increased earnings per year per 1-point IQ increase. With a 7 percent discount rate assumption, the value IQ estimates range from $893 to $1,958 in increased earnings per year per 1-point IQ increase.

The EPA analyzed the aggregate national IQ and present-value loss estimates for two base case and three emission control scenarios. The highest losses are estimated for the 2005 base case. For the population of prenatally exposed children included in the analysis (almost 240,000), Hg exposures under baseline conditions during the year 2005 are estimated to have resulted in more than 25,500 IQ points lost. As-

suming a 3 percent discount rate, the present-year value of these losses ranges from $204.8 million to $292.5 million nationally.[371] These losses represent expected present value of declines in future net earnings over the entire lifetimes of the children who are prenatally exposed during the year 2005. With a 7 percent discount rate, the present-year value range is considerably lower: $22.8 million to $50.0 million.

For this rule, the EPA generated estimates of aggregate nationwide benefits associated with reductions in Hg exposures and resulting reductions in IQ losses. Most importantly, the benefits of the 2016 MATS scenario (relative to the 2016 base case) are estimated to range between $4 million and $6 million (assuming a 3 percent discount rate), because of an estimated 511 point reduction in IQ losses. The EPA recognizes that these calculated benefits are a small subset of the benefits of reducing Hg emissions.

2. Health and Welfare Co-Benefits

Emission controls installed to meet the requirements of this rule will generate co-benefits by reducing criteria pollutants including $PM_{2.5}$ and SO_2, as well as CO_2. For this rule, we were only able to estimate the mortality benefits of $PM_{2.5}$ reductions due to changes in emissions of SO_2 and direct $PM_{2.5}$ and

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[371] Monetized benefits estimates are for an immediate change in MeHg levels in fish. If a lag in the response of MeHg levels in fish were assumed, the monetized benefits could be significantly lower, depending on the length of the lag and the discount rate used. As noted in the discussion of the Mercury Maps modeling, the relationship between deposition and fish tissue MeHg is proportional in equilibrium, but the Mercury Maps approach does not provide any information on the time lag of response.

climate benefits resulting from CO_2 reductions. Additional co-benefits may result from decreases in $PM_{2.5}$ morbidity impacts, decreases in sulfur deposition and direct health effects of SO_2, and improvements in visibility in national parks and wilderness areas. Total co-benefits may be higher than the partial estimates of co-benefits provided here. Our best estimate of the monetized health and climate co-benefits of this rule in 2016 at a 3 percent discount rate are $37 billion to $90 billion or $33 billion to $81 billion at a 7 percent discount rate (2007$). Using alternate relationships between $PM_{2.5}$ and premature mortality supplied by experts, higher and lower health co-benefits estimates are plausible, but most of the expert-based estimates fall between these two estimates.[372]

a. Human Health Co-Benefits. To estimate the human health co-benefits of this rule, the EPA used benefit-per-ton factors to quantify the changes in $PM_{2.5}$-related health impacts and monetized benefits based on changes in SO_2 and direct $PM_{2.5}$ emissions. These benefit-per-ton factors were based on an interim baseline and policy scenario for which full-scale ambient air quality modeling and air quality-based human health benefits assessments were performed. This general approach and methodology is laid out in Fann, *et al.*, (2009),[373] but for this rule the air quality modeling used a better spatial representation of the

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[372] Roman, *et al.*, 2008. Expert Judgment Assessment of the Mortality Impact of Changes in Ambient Fine Particulate Matter in the U.S. Environ. Sci. Technol., 42, 7, 2268–2274.

[373] Fann, N., C.M. Fulcher, B.J. Hubbell, 2009. "The influence of location, source, and emission type in estimates of the human health benefits of reducing a ton of air pollution." Air Qual Atmos Health (2009) 2:169–176.

emission changes from EGUs. Using a benefit-per-ton approach adds another important source of uncertainty to the benefits estimates. For more details on the creation of the benefit-per-ton factors and their application to emission reductions under this rule, please refer to the RIA for this rule in the docket.

Table 9 presents the estimates of reduced annual incidence of $PM_{2.5}$-related health effects in 2016 resulting from this rule. Table 10 presents the estimated annual monetary value of the reduced incidence of quantified health endpoints in 2016 resulting from this rule.

The reduction in premature fatalities each year accounts for between 93 and 97 percent of the estimated health co-benefits that were monetized.

TABLE 9—ESTIMATED REDUCTIONS IN INCIDENCE OF $PM_{2.5}$-RELATED HEALTH EFFECTS IN 2016[a]

Health effect	Number of reduced cases
Adult Premature Mortality	
Pope *et al.*, (2002) (age >30)	4,200. (1,200 to 7,200).
Laden *et al.*, (2006) (age >25)	11,000. (5,000 to 17,000).
Infant Premature Mortality (<1 year)	20. (-22 to 61).
Chronic Bronchitis	2,800. (88 to 5,600).
Non-fatal heart attacks (age >18)	4,700. (1,200 to 8,300).
Hospital admissions—respiratory (all ages)	830. (330 to 1,300).
Hospital admissions—cardiovascular (age >18)	1,800. (1,200 to 2,200).
Emergency room visits for asthma (age <18)	3,100. (1,600 to 4,700).
Acute bronchitis (age 8–12)	6,300. (-1,400 to 14,000).
Lower respiratory symptoms (age 7–14)	80,000. (31,000 to 130,000).
Upper respiratory symptoms (asthmatics age 9–11)	60,000. (11,000 to 110,000).
Asthma exacerbation (asthmatics 6–18)	130,000. (4,500 to 450,000).

Lost work days (ages 18–65)	540,000. (460,000 to 620,000).
Minor restricted-activity days (ages 18–65)	3,200,000. (2,600,000 to 3,800,000).

[a] Values rounded to two significant figures. Co-benefits from reducing exposure to ozone, other criteria pollutants, and HAP, as well as reducing visibility impairment and ecosystem effects are not included here.

TABLE 10—ESTIMATED MONETARY VALUE (BILLIONS 2007$) OF $PM_{2.5}$-RELATED HEALTH BENEFITS IN 2016[a]

Health effect	Monetized benefits
Adult Premature Mortality	
Pope *et al.*, (2002) (age >30):	
3% discount rate	$34. ($2.6 to $100).
7% discount rate	$30. ($2.4 to $92).
Laden *et al.*, (2006) (age >25):	
3% discount rate	$87. ($7.5 to $250).
7% discount	$78. ($6.8 to $230).
Infant Premature Mortality (<1 year)	$0.2. ($-0.2 to $0.8).
Chronic Bronchitis	$1.4. ($0.1 to $6.4).
Non-fatal heart attacks (age >18):	
3% discount rate	$0.5 ($0.1 to $1.3).
7% discount	$0.4 ($0.1 to $1.0).
Hospital admissions—respiratory (all ages)	$0.01. ($0.01 to $0.02).
Hospital admissions—cardiovascular (age >18)	$0.03. (<$0.01 to $0.05).
Emergency room visits for asthma (age <18)	<$0.01

Acute bronchitis (age 8–12)	<$0.01
Lower respiratory symptoms (age 7–14)	<$0.01
Upper respiratory symptoms (asthmatics age 9–11)	<$0.01
Asthma exacerbation (asthmatics 6–18)	<$0.01
Lost work days (ages 18–65)	$0.1
	($0.1 to $0.1).
Minor restricted-activity days (ages 18–65)	$0.2
	($0.1 to $0.3).
Monetized Health Co-Benefits	
Pope, *et al.*, (2002):	
3% discount rate	$36.
	($2.8–$110).
7% discount rate	$33.
	($2.5–$100).
Laden, *et al.*, (2006):	
3% discount rate	$89.
	($7.7–$260).
7% discount rate	$80.
	($6.9–$240).

[a] Values rounded to two significant figures. Co-benefits from reducing exposure to ozone, other criteria pollutants, and HAP, as well as reducing visibility impairment and ecosystem effects are not included here.

It is important to note that the magnitude of the $PM_{2.5}$ co-benefits is largely driven by the concentration response function for premature mortality. Experts have advised the EPA to consider a variety of assumptions, including estimates based both on empirical (epidemiological) studies and judgments elicited from scientific experts, to characterize the uncertainty in the relationship between $PM_{2.5}$ concentrations and premature mortality. We cite two key empirical studies, one based on the American Cancer Society cohort study[374] and the other based on the extended Six Cities cohort study.[375] The analyses upon which this rule is based were selected from the peer-reviewed scientific literature. We used up-to-date assessment tools, and we believe the results are highly useful in assessing this rule.

Every benefit analysis examining the potential effects of a change in environmental protection requirements is limited to some extent by data gaps, model capabilities (such as geographic coverage), and uncertainties in the underlying scientific and economic studies used to configure the benefit and cost models. Gaps in the scientific literature often result in the inability to estimate quantitative changes in health and environmental effects, or to assign economic values even to those health and environmental outcomes that can be quantified. The uncertainties in the underlying scientific and economics literature

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[374] Pope *et al.*, 2002. "Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution." Journal of the American Medical Association. 287:1132–1141.

[375] Laden*et al.*, 2006. "Reduction in Fine Particulate Air Pollution and Mortality." American Journal of Respiratory and Critical Care Medicine. 173:667–672.

(that may result in overestimation or underestimation of the co-benefits) are discussed in detail in the RIA. Despite these uncertainties, we believe the benefit analysis for this rule provides a reasonable indication of the expected health co-benefits of the rulemaking in future years under a set of reasonable assumptions.

When characterizing uncertainty in the PM-mortality relationship, the EPA has historically presented a sensitivity analysis applying alternate assumed thresholds in the PM concentration-response relationship. In its synthesis of the current state of the PM science, the EPA's 2009 Integrated Science Assessment for Particulate Matter concluded that a no-threshold log-linear model most adequately portrays the PM-mortality concentration-response relationship.

In the RIA accompanying this rulemaking, rather than segmenting out impacts predicted to be associated with levels above and below a "bright line" threshold, the EPA includes a "lowest measured level" (LML) analysis that illustrates the increasing uncertainty that characterizes exposure attributed to levels of $PM_{2.5}$ below the LML of each epidemiological study used to estimate $PM_{2.5}$-related premature death. Figures provided in the RIA show the distribution of baseline exposure to $PM_{2.5}$, as well as the lowest air quality levels measured in each of the epidemiology cohort studies. This information provides a context for considering the likely portion of PM-related mortality benefits occurring above or below the LML of each study; in general, our confidence in the size of the estimated reduction in $PM_{2.5}$-related

premature mortality diminishes as baseline concentrations of $PM_{2.5}$ are lowered.

Based on the modeled interim baseline which is approximately equivalent to the final baseline (*see* Appendix A of the RIA), 11 percent and 73 percent of the estimated avoided mortality impacts occur at or above an annual mean $PM_{2.5}$ level of 10 $\mu g/m^3$ (the LML of the Laden *et al.*, 2006 study) or 7.5 $\mu g/m^3$ (the LML of the Pope, *et al.*, 2002 study), respectively. Although the LML analysis provides some insight into the level of uncertainty in the estimated PM mortality benefits, the EPA does not view the LML as a threshold and continues to quantify PM-related mortality impacts using a full range of modeled air quality concentrations. A large fraction of the $PM_{2.5}$-related benefits occur below the level of the National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$ at 15 $\mu g/m^3$, which was set in 2006. It is important to emphasize that NAAQS are not set at a level of zero risk. Instead, the NAAQS reflect the level determined by the Administrator to be protective of public health within an adequate margin of safety, taking into consideration effects on susceptible populations. While benefits occurring below the standard may be less certain than those occurring above the standard, EPA considers them to be legitimate components of the total benefits estimate.

It is important to note that the monetized benefits include many but not all health effects associated with $PM_{2.5}$ exposure. Benefits are shown as a range from Pope, *et al.*, (2002), to Laden, *et al.*, (2006). These studies assume that all fine particles, regardless of their chemical composition, are equally potent in causing premature mortality because there is no

clear scientific evidence that would support the development of differential effects estimates by particle type. Even though we assume that all fine particles have equivalent health effects, the benefit-per-ton estimates vary between directly-emitted particles (carbonaceous and crustal particles) and SO_2 emissions that form sulfate particles, based on the location of emission changes and magnitude of population exposure changes. Regardless, however, the assumption that all fine particles are equally potent in causing premature mortality adds uncertainty to the benefits estimate.

b. Non-Climate Welfare Co-Benefits. Emission controls installed to comply with the requirements specified in this rule will also generate co-benefits by improving visibility. We anticipate that improvements in visibility in Class I areas as well as residential areas where people live, work, and recreate could be substantial. Because full-scale air quality modeling was not performed for this rule, we are unable to quantify these visibility co-benefits for this rule. However, the estimated value of visibility benefits calculated from the modeled interim baseline and policy scenario was $1.1 billion (in 2007$). These visibility benefits are not included in the total co-benefits estimate of the final policy scenario used as a basis for this final rule. The distribution of emission reductions did not change substantially in the visibility regions studied, therefore visibility benefits of the final policy scenario are likely to be of a similar magnitude.

Ecosystem and other welfare effects include reduced acidification and, in the case of NO_X, eutrophication of water bodies; possible reduced nitrate con-

tamination of drinking water; ozone vegetation damage; a reduction in the role of sulfate in Hg methylation; and reduced acid and particulate deposition that causes damages to cultural monuments, as well as soiling and other materials damage. To illustrate the important nature of benefit categories the EPA is currently unable to monetize, we discuss the potential public welfare and environmental impacts related to reductions in emissions required by this rule in the RIA, including reduced visibility impairment, reduced effects from acid deposition, reduced effects from nutrient enrichment, and reduced vegetation effects from ambient exposure to SO_2 and NO_2.

c. Climate co-benefits. This rule is expected to reduce CO_2 emissions from the electricity sector. The EPA has assigned a dollar value to reductions in CO_2 emissions using recent estimates of the "social cost of carbon" (SCC). The SCC is an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year or the per metric ton benefit estimate relating to decreases in CO_2 emissions. It is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damage from increased flood risk, and the value of ecosystem services due to climate change.

The SCC estimates used in this analysis were developed through an interagency process that included the EPA and other executive branch entities, and that concluded in February 2010. We first used these SCC estimates in the benefits analysis for the final joint EPA/DOT Rulemaking to establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; see the

rule's preamble for discussion about application of the SCC (75 FR 25324; May 7, 2010). The SCC Technical Support Document (SCC TSD) provides a complete discussion of the methods used to develop these SCC estimates.[376]

The interagency group selected four SCC values for use in regulatory analyses, which we have applied in this analysis: $5.9, $24.3, $39, and $74.4 per metric ton of CO_2 emissions in 2016, in 2007 dollars. The first three values are based on the average SCC from three integrated assessment models, at discount rates of 5, 3, and 2.5 percent, respectively. Social cost of carbon values at several discount rates are included because the literature shows that the SCC is quite sensitive to assumptions about the discount rate, and because no consensus exists on the appropriate rate to use in an intergenerational context. The fourth value is the 95th percentile of the SCC from all three values at a 3 percent discount rate. It is included to represent higher-than-expected impacts from temperature change further out in the extremes of the SCC distribution. Low probability, high impact events are incorporated into all of the SCC values through explicit consideration of their effects in two

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[376] Docket ID EPA–HQ–OAR–2009–0472–114577, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon, with participation by Council of Economic Advisers, Council on Environmental Quality, Department of Agriculture, Department of Commerce, Department of Energy, Department of Transportation, Environmental Protection Agency, National Economic Council, Office of Energy and Climate Change, Office of Management and Budget, Office of Science and Technology Policy, and Department of Treasury (February 2010). Also available at *http://epa.gov/otaq/climate/regulations.htm.*

of the three values as well as the use of a probability density function for equilibrium climate sensitivity. Treating climate sensitivity probabilistically results in more high temperature outcomes, which in turn leads to higher projections of damages.

Applying the global SCC estimates using a 3 percent discount rate, we estimate the value of the climate related benefits of this rule in 2016 is $360 million (2007$), as shown in Table 11. See the RIA for more detail on the methodology used to calculate these benefits and additional estimates of climate benefits using different discount rates and the 95th percentile of the 3 percent discount rate SCC. Important limitations and uncertainties of the SCC approach are also described in the RIA.

TABLE 11—ESTIMATED MONETARY VALUE (BILLIONS 2007$) OF $PM_{2.5}$-RELATED HEALTH BENEFITS AND CLIMATE BENEFITS IN 2016[a]

Effect	Monetized benefits
Monetized Health Co-Benefits	
Pope, *et al.*, (2002):	
3% discount rate	$36 ($2.8–$110)
7% discount rate	$33 ($2.5–$100)
Laden, *et al.*, (2006):	
3% discount rate	$89 ($7.7–$260)
7% discount rate	$80 ($6.9–$240)
Climate-related Co-Benefits (3% discount rate)	$0.36
Monetized Total Co-Benefits	
Pope, *et al.*, (2002):	
3% discount rate	$37 ($3.2–$110)
7% discount rate	$33 ($2.9–$100)
Laden, *et al.*, (2006):	
3% discount rate	$90 ($8.0–$260)
7% discount rate	$81 ($7.3–$240)

• Values rounded to two significant figures. Co-benefits from reducing exposure to ozone, other criteria pollutants, and HAP, as well as reducing visibility impairment and ecosystem effects are not included here.

Our best estimate for the monetized total health and climate co-benefits of this rule in 2016 at a 3 percent discount rate is between $37 billion and $90 billion or between $33 billion and $81 billion (2007$) at a 7 percent discount rate. These estimates account for the quantified health and climate benefits described in Table 11.

[CONTENT OMITTED]

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No. ____

IN THE

Supreme Court of the United States

UTILITY AIR REGULATORY GROUP,
Petitioner,

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,
Respondent.

On Petition for a Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

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APPENDIX VOLUME II OF II

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TABLE OF CONTENTS

Page

VOLUME I:

APPENDIX A: Order of the U.S. Court of Appeals for the District of Columbia Circuit Denying All Petitions for Review, Except the Petition for Review in No. 12-1174, and Dismissing That Petition 1a

APPENDIX B: Opinion of the U.S. Court of Appeals for the District of Columbia Circuit 3a

APPENDIX C: U.S. Environmental Protection Agency, National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units; Final Rule, 77 Fed. Reg. 9304 (Feb. 16, 2012) (excerpts) 105a

VOLUME II:

APPENDIX D: Federal Statutes
Clean Air Act § 112, 42 U.S.C. § 7412 (excerpts) 477a

APPENDIX E: EPA's Responses to Public Comments on EPA's National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units, Vol. 1 (Dec. 2011), Docket No. EPA-HQ-OAR-2009-0234-20126 (excerpts) 506a

APPENDIX F: Utility Air Regulatory Group, Comments on National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units: Proposed Rule (Aug. 4, 2011), Docket No. EPA-HQ-OAR-2009-0234-17775 (excerpts) 510a

APPENDIX G: U.S. Environmental Protection Agency, National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units; Proposed Rule, 76 Fed. Reg. 24,976 (May 3, 2011) (excerpts) 514a

APPENDIX H: U.S. Environmental Protection Agency, Revision of December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units and the Removal of Coal- and Oil-Fired Electric Utility Steam Generating Units From the Section 112(c) List; Final Rule, 70 Fed. Reg. 15,994 (Mar. 29, 2005) (excerpt) 544a

APPENDIX I: U.S. Environmental Protection Agency, Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units; Notice of Regulatory Finding, 65 Fed. Reg. 79,825 (Dec. 20, 2000) 610a

APPENDIX J: U.S. Environmental Protection Agency, EPA-453/R-98-004a, Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units -- Final Report to Congress, Vol. 1 (Feb. 1998), Docket No. EPA-HQ-OAR-2009-0234-3052 (excerpts) 636a

APPENDIX D

Clean Air Act § 112, 42 U.S.C.

§ 7412. Hazardous air pollutants

(a) Definitions

For purposes of this section, except subsection (r) of this section—

(1) Major source

The term "major source" means any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants. The Administrator may establish a lesser quantity, or in the case of radionuclides different criteria, for a major source than that specified in the previous sentence, on the basis of the potency of the air pollutant, persistence, potential for bioaccumulation, other characteristics of the air pollutant, or other relevant factors.

(2) Area source

The term "area source" means any stationary source of hazardous air pollutants that is not a major source. For purposes of this section, the term "area source" shall not include motor vehicles or nonroad vehicles subject to regulation under subchapter II of this chapter.

(3) Stationary source

The term "stationary source" shall have the same meaning as such term has under section 7411(a) of this title.

(4) New source

The term "new source" means a stationary source the construction or reconstruction of which is commenced after the Administrator first proposes regulations under this section establishing an emission standard applicable to such source.

(5) Modification

The term "modification" means any physical change in, or change in the method of operation of, a major source which increases the actual emissions of any hazardous air pollutant emitted by such source by more than a de minimis amount or which results in the emission of any hazardous air pollutant not previously emitted by more than a de minimis amount.

(6) Hazardous air pollutant

The term "hazardous air pollutant" means any air pollutant listed pursuant to subsection (b) of this section.

(7) Adverse environmental effect

The term "adverse environmental effect" means any significant and widespread adverse effect, which may reasonably be anticipated, to wildlife, aquatic life, or other natural resources, including adverse impacts on populations of endangered or threatened species or significant deg-

radation of environmental quality over broad areas.

(8) Electric utility steam generating unit

The term "electric utility steam generating unit" means any fossil fuel fired combustion unit of more than 25 megawatts that serves a generator that produces electricity for sale. A unit that cogenerates steam and electricity and supplies more than one-third of its potential electric output capacity and more than 25 megawatts electrical output to any utility power distribution system for sale shall be considered an electric utility steam generating unit.

(9) Owner or operator

The term "owner or operator" means any person who owns, leases, operates, controls, or supervises a stationary source.

(10) Existing source

The term "existing source" means any stationary source other than a new source.

(11) Carcinogenic effect

Unless revised, the term "carcinogenic effect" shall have the meaning provided by the Administrator under Guidelines for Carcinogenic Risk Assessment as of the date of enactment.[1] Any revisions in the existing Guidelines shall be subject to notice and opportunity for comment.

[CONTENT OMITTED]

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[1] See References in Text note below.

(c) List of source categories

(1) In general

Not later than 12 months after November 15, 1990, the Administrator shall publish, and shall from time to time, but no less often than every 8 years, revise, if appropriate, in response to public comment or new information, a list of all categories and subcategories of major sources and area sources (listed under paragraph (3)) of the air pollutants listed pursuant to subsection (b) of this section. To the extent practicable, the categories and subcategories listed under this subsection shall be consistent with the list of source categories established pursuant to section 7411 of this title and part C of this subchapter. Nothing in the preceding sentence limits the Administrator's authority to establish subcategories under this section, as appropriate.

(2) Requirement for emissions standards

For the categories and subcategories the Administrator lists, the Administrator shall establish emissions standards under subsection (d) of this section, according to the schedule in this subsection and subsection (e) of this section.

(3) Area sources

The Administrator shall list under this subsection each category or subcategory of area sources which the Administrator finds presents a threat of adverse effects to human health or the environment (by such sources individually or in the aggregate) warranting regulation under this section. The Administrator shall, not later than 5 years af-

ter November 15, 1990, and pursuant to subsection (k)(3)(B) of this section, list, based on actual or estimated aggregate emissions of a listed pollutant or pollutants, sufficient categories or subcategories of area sources to ensure that area sources representing 90 percent of the area source emissions of the 30 hazardous air pollutants that present the greatest threat to public health in the largest number of urban areas are subject to regulation under this section. Such regulations shall be promulgated not later than 10 years after November 15, 1990.

(4) Previously regulated categories

The Administrator may, in the Administrator's discretion, list any category or subcategory of sources previously regulated under this section as in effect before November 15, 1990.

(5) Additional categories

In addition to those categories and subcategories of sources listed for regulation pursuant to paragraphs (1) and (3), the Administrator may at any time list additional categories and subcategories of sources of hazardous air pollutants according to the same criteria for listing applicable under such paragraphs. In the case of source categories and subcategories listed after publication of the initial list required under paragraph (1) or (3), emission standards under subsection (d) of this section for the category or subcategory shall be promulgated within 10 years after November 15, 1990, or within 2 years after the date on which such category or subcategory is listed, whichever is later.

(6) Specific pollutants

With respect to alkylated lead compounds, polycyclic organic matter, hexachlorobenzene, mercury, polychlorinated biphenyls, 2,3,7,8-tetrachlorodibenzofurans and 2,3,7,8-tetrachlorodibenzo-p-dioxin, the Administrator shall, not later than 5 years after November 15, 1990, list categories and subcategories of sources assuring that sources accounting for not less than 90 per centum of the aggregate emissions of each such pollutant are subject to standards under subsection (d)(2) or (d)(4) of this section. Such standards shall be promulgated not later than 10 years after November 15, 1990. This paragraph shall not be construed to require the Administrator to promulgate standards for such pollutants emitted by electric utility steam generating units.

(7) Research facilities

The Administrator shall establish a separate category covering research or laboratory facilities, as necessary to assure the equitable treatment of such facilities. For purposes of this section, "research or laboratory facility" means any stationary source whose primary purpose is to conduct research and development into new processes and products, where such source is operated under the close supervision of technically trained personnel and is not engaged in the manufacture of products for commercial sale in commerce, except in a de minimis manner.

(8) Boat manufacturing

When establishing emissions standards for styrene, the Administrator shall list boat manufacturing as a separate subcategory unless the Administrator finds that such listing would be inconsistent with the goals and requirements of this chapter.

(9) Deletions from the list

(A) Where the sole reason for the inclusion of a source category on the list required under this subsection is the emission of a unique chemical substance, the Administrator shall delete the source category from the list if it is appropriate because of action taken under either subparagraphs (C) or (D) of subsection (b)(3) of this section.

(B) The Administrator may delete any source category from the list under this subsection, on petition of any person or on the Administrator's own motion, whenever the Administrator makes the following determination or determinations, as applicable:

> (i) In the case of hazardous air pollutants emitted by sources in the category that may result in cancer in humans, a determination that no source in the category (or group of sources in the case of area sources) emits such hazardous air pollutants in quantities which may cause a lifetime risk of cancer greater than one in one million to the individual in the population who is most exposed to emissions of such pollutants from the source (or group of sources in the case of area sources).

(ii) In the case of hazardous air pollutants that may result in adverse health effects in humans other than cancer or adverse environmental effects, a determination that emissions from no source in the category or subcategory concerned (or group of sources in the case of area sources) exceed a level which is adequate to protect public health with an ample margin of safety and no adverse environmental effect will result from emissions from any source (or from a group of sources in the case of area sources).

The Administrator shall grant or deny a petition under this paragraph within 1 year after the petition is filed.

(d) Emission standards

(1) In general

The Administrator shall promulgate regulations establishing emission standards for each category or subcategory of major sources and area sources of hazardous air pollutants listed for regulation pursuant to subsection (c) of this section in accordance with the schedules provided in subsections (c) and (e) of this section. The Administrator may distinguish among classes, types, and sizes of sources within a category or subcategory in establishing such standards except that, there shall be no delay in the compliance date for any standard applicable to any source under subsection (i) of this section as the result of the authority provided by this sentence.

(2) Standards and methods

Emissions standards promulgated under this subsection and applicable to new or existing sources of hazardous air pollutants shall require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for new or existing sources in the category or subcategory to which such emission standard applies, through application of measures, processes, methods, systems or techniques including, but not limited to, measures which—

(A) reduce the volume of, or eliminate emissions of, such pollutants through process changes, substitution of materials or other modifications,

(B) enclose systems or processes to eliminate emissions,

(C) collect, capture or treat such pollutants when released from a process, stack, storage or fugitive emissions point,

(D) are design, equipment, work practice, or operational standards (including requirements for operator training or certification) as provided in subsection (h) of this section, or

(E) are a combination of the above.

None of the measures described in subparagraphs (A) through (D) shall, consistent with the provi-

sions of section 7414(c) of this title, in any way compromise any United States patent or United States trademark right, or any confidential business information, or any trade secret or any other intellectual property right.

(3) New and existing sources

The maximum degree of reduction in emissions that is deemed achievable for new sources in a category or subcategory shall not be less stringent than the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator. Emission standards promulgated under this subsection for existing sources in a category or subcategory may be less stringent than standards for new sources in the same category or subcategory but shall not be less stringent, and may be more stringent than—

(A) the average emission limitation achieved by the best performing 12 percent of the existing sources (for which the Administrator has emissions information), excluding those sources that have, within 18 months before the emission standard is proposed or within 30 months before such standard is promulgated, whichever is later, first achieved a level of emission rate or emission reduction which complies, or would comply if the source is not subject to such standard, with the lowest achievable emission rate (as defined by section 7501 of this title) applicable to the source category and prevailing at the time, in the category or subcategory for categories and subcategories with 30 or more sources, or

(B) the average emission limitation achieved by the best performing 5 sources (for which the Administrator has or could reasonably obtain emissions information) in the category or subcategory for categories or subcategories with fewer than 30 sources.

(4) Health threshold

With respect to pollutants for which a health threshold has been established, the Administrator may consider such threshold level, with an ample margin of safety, when establishing emission standards under this subsection.

(5) Alternative standard for area sources

With respect only to categories and subcategories of area sources listed pursuant to subsection (c) of this section, the Administrator may, in lieu of the authorities provided in paragraph (2) and subsection (f) of this section, elect to promulgate standards or requirements applicable to sources in such categories or subcategories which provide for the use of generally available control technologies or management practices by such sources to reduce emissions of hazardous air pollutants.

(6) Review and revision

The Administrator shall review, and revise as necessary (taking into account developments in practices, processes, and control technologies), emission standards promulgated under this section no less often than every 8 years.

(7) Other requirements preserved

No emission standard or other requirement promulgated under this section shall be interpreted, construed or applied to diminish or replace the requirements of a more stringent emission limitation or other applicable requirement established pursuant to section 7411 of this title, part C or D of this subchapter, or other authority of this chapter or a standard issued under State authority.

(8) Coke ovens

(A) Not later than December 31, 1992, the Administrator shall promulgate regulations establishing emission standards under paragraphs (2) and (3) of this subsection for coke oven batteries. In establishing such standards, the Administrator shall evaluate—

(i) the use of sodium silicate (or equivalent) luting compounds to prevent door leaks, and other operating practices and technologies for their effectiveness in reducing coke oven emissions, and their suitability for use on new and existing coke oven batteries, taking into account costs and reasonable commercial door warranties; and

(ii) as a basis for emission standards under this subsection for new coke oven batteries that begin construction after the date of proposal of such standards, the Jewell design Thompson non-recovery coke oven batteries and other non-recovery coke oven technologies, and other appropriate emission control and coke production technologies, as to their effectiveness in reducing coke oven emissions and

their capability for production of steel quality coke.

Such regulations shall require at a minimum that coke oven batteries will not exceed 8 per centum leaking doors, 1 per centum leaking lids, 5 per centum leaking offtakes, and 16 seconds visible emissions per charge, with no exclusion for emissions during the period after the closing of self-sealing oven doors. Notwithstanding subsection (i) of this section, the compliance date for such emission standards for existing coke oven batteries shall be December 31, 1995.

(B) The Administrator shall promulgate work practice regulations under this subsection for coke oven batteries requiring, as appropriate—

(i) the use of sodium silicate (or equivalent) luting compounds, if the Administrator determines that use of sodium silicate is an effective means of emissions control and is achievable, taking into account costs and reasonable commercial warranties for doors and related equipment; and

(ii) door and jam cleaning practices.

Notwithstanding subsection (i) of this section, the compliance date for such work practice regulations for coke oven batteries shall be not later than the date 3 years after November 15, 1990.

(C) For coke oven batteries electing to qualify for an extension of the compliance date for standards promulgated under subsection (f) of this section in accordance with subsection (i)(8) of this section, the emission standards under this subsec-

tion for coke oven batteries shall require that coke oven batteries not exceed 8 per centum leaking doors, 1 per centum leaking lids, 5 per centum leaking offtakes, and 16 seconds visible emissions per charge, with no exclusion for emissions during the period after the closing of self-sealing doors. Notwithstanding subsection (i) of this section, the compliance date for such emission standards for existing coke oven batteries seeking an extension shall be not later than the date 3 years after November 15, 1990.

(9) Sources licensed by the Nuclear Regulatory Commission

No standard for radionuclide emissions from any category or subcategory of facilities licensed by the Nuclear Regulatory Commission (or an Agreement State) is required to be promulgated under this section if the Administrator determines, by rule, and after consultation with the Nuclear Regulatory Commission, that the regulatory program established by the Nuclear Regulatory Commission pursuant to the Atomic Energy Act [42 U.S.C. 2011 et seq.] for such category or subcategory provides an ample margin of safety to protect the public health. Nothing in this subsection shall preclude or deny the right of any State or political subdivision thereof to adopt or enforce any standard or limitation respecting emissions of radionuclides which is more stringent than the standard or limitation in effect under section 7411 of this title or this section.

(10) Effective date

Emission standards or other regulations promulgated under this subsection shall be effective upon promulgation.

[CONTENT OMITTED]

(f) Standard to protect health and environment

(1) Report

Not later than 6 years after November 15, 1990, the Administrator shall investigate and report, after consultation with the Surgeon General and after opportunity for public comment, to Congress on—

(A) methods of calculating the risk to public health remaining, or likely to remain, from sources subject to regulation under this section after the application of standards under subsection (d) of this section;

(B) the public health significance of such estimated remaining risk and the technologically and commercially available methods and costs of reducing such risks;

(C) the actual health effects with respect to persons living in the vicinity of sources, any available epidemiological or other health studies, risks presented by background concentrations of hazardous air pollutants, any uncertainties in risk assessment methodology or other health assessment technique, and any negative health or environmental consequences to the community of efforts to reduce such risks; and

(D) recommendations as to legislation regarding such remaining risk.

(2) Emission standards

(A) If Congress does not act on any recommendation submitted under paragraph (1), the Administrator shall, within 8 years after promulgation of standards for each category or subcategory of sources pursuant to subsection (d) of this section, promulgate standards for such category or subcategory if promulgation of such standards is required in order to provide an ample margin of safety to protect public health in accordance with this section (as in effect before November 15, 1990) or to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect. Emission standards promulgated under this subsection shall provide an ample margin of safety to protect public health in accordance with this section (as in effect before November 15, 1990), unless the Administrator determines that a more stringent standard is necessary to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect. If standards promulgated pursuant to subsection (d) of this section and applicable to a category or subcategory of sources emitting a pollutant (or pollutants) classified as a known, probable or possible human carcinogen do not reduce lifetime excess cancer risks to the individual most exposed to emissions from a source in the category or subcategory to less than one in one million, the Administrator shall promulgate standards under this subsection for such source category.

(B) Nothing in subparagraph (A) or in any other provision of this section shall be construed as affecting, or applying to the Administrator's interpretation of this section, as in effect before November 15, 1990, and set forth in the Federal Register of September 14, 1989 (54 Federal Register 38044).

(C) The Administrator shall determine whether or not to promulgate such standards and, if the Administrator decides to promulgate such standards, shall promulgate the standards 8 years after promulgation of the standards under subsection (d) of this section for each source category or subcategory concerned. In the case of categories or subcategories for which standards under subsection (d) of this section are required to be promulgated within 2 years after November 15, 1990, the Administrator shall have 9 years after promulgation of the standards under subsection (d) of this section to make the determination under the preceding sentence and, if required, to promulgate the standards under this paragraph.

(3) Effective date

Any emission standard established pursuant to this subsection shall become effective upon promulgation.

(4) Prohibition

No air pollutant to which a standard under this subsection applies may be emitted from any stationary source in violation of such standard, except that in the case of an existing source—

(A) such standard shall not apply until 90 days after its effective date, and

(B) the Administrator may grant a waiver permitting such source a period of up to 2 years after the effective date of a standard to comply with the standard if the Administrator finds that such period is necessary for the installation of controls and that steps will be taken during the period of the waiver to assure that the health of persons will be protected from imminent endangerment.

(5) Area sources

The Administrator shall not be required to conduct any review under this subsection or promulgate emission limitations under this subsection for any category or subcategory of area sources that is listed pursuant to subsection (c)(3) of this section and for which an emission standard is promulgated pursuant to subsection (d)(5) of this section.

(6) Unique chemical substances

In establishing standards for the control of unique chemical substances of listed pollutants without CAS numbers under this subsection, the Administrator shall establish such standards with respect to the health and environmental effects of the substances actually emitted by sources and direct transformation byproducts of such emissions in the categories and subcategories.

[CONTENT OMITTED]

(m) Atmospheric deposition to Great Lakes and coastal waters

(1) Deposition assessment

The Administrator, in cooperation with the Under Secretary of Commerce for Oceans and Atmosphere, shall conduct a program to identify and assess the extent of atmospheric deposition of hazardous air pollutants (and in the discretion of the Administrator, other air pollutants) to the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters. As part of such program, the Administrator shall—

(A) monitor the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters, including monitoring of the Great Lakes through the monitoring network established pursuant to paragraph (2) of this subsection and designing and deploying an atmospheric monitoring network for coastal waters pursuant to paragraph (4);

(B) investigate the sources and deposition rates of atmospheric deposition of air pollutants (and their atmospheric transformation precursors);

(C) conduct research to develop and improve monitoring methods and to determine the relative contribution of atmospheric pollutants to total pollution loadings to the Great Lakes, the Chesapeake Bay, Lake Champlain, and coastal waters;

(D) evaluate any adverse effects to public health or the environment caused by such dep-

osition (including effects resulting from indirect exposure pathways) and assess the contribution of such deposition to violations of water quality standards established pursuant to the Federal Water Pollution Control Act [33 U.S.C. 1251 et seq.] and drinking water standards established pursuant to the Safe Drinking Water Act [42 U.S.C. 300f et seq.]; and

(E) sample for such pollutants in biota, fish, and wildlife of the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters and characterize the sources of such pollutants.

(2) Great Lakes monitoring network

The Administrator shall oversee, in accordance with Annex 15 of the Great Lakes Water Quality Agreement, the establishment and operation of a Great Lakes atmospheric deposition network to monitor atmospheric deposition of hazardous air pollutants (and in the Administrator's discretion, other air pollutants) to the Great Lakes.

(A) As part of the network provided for in this paragraph, and not later than December 31, 1991, the Administrator shall establish in each of the 5 Great Lakes at least 1 facility capable of monitoring the atmospheric deposition of hazardous air pollutants in both dry and wet conditions.

(B) The Administrator shall use the data provided by the network to identify and track the movement of hazardous air pollutants through the Great Lakes, to determine the por-

tion of water pollution loadings attributable to atmospheric deposition of such pollutants, and to support development of remedial action plans and other management plans as required by the Great Lakes Water Quality Agreement.

(C) The Administrator shall assure that the data collected by the Great Lakes atmospheric deposition monitoring network is in a format compatible with databases sponsored by the International Joint Commission, Canada, and the several States of the Great Lakes region.

(3) Monitoring for the Chesapeake Bay and Lake Champlain

The Administrator shall establish at the Chesapeake Bay and Lake Champlain atmospheric deposition stations to monitor deposition of hazardous air pollutants (and in the Administrator's discretion, other air pollutants) within the Chesapeake Bay and Lake Champlain watersheds. The Administrator shall determine the role of air deposition in the pollutant loadings of the Chesapeake Bay and Lake Champlain, investigate the sources of air pollutants deposited in the watersheds, evaluate the health and environmental effects of such pollutant loadings, and shall sample such pollutants in biota, fish and wildlife within the watersheds, as necessary to characterize such effects.

(4) Monitoring for coastal waters

The Administrator shall design and deploy atmospheric deposition monitoring networks for coastal waters and their watersheds and shall

make any information collected through such networks available to the public. As part of this effort, the Administrator shall conduct research to develop and improve deposition monitoring methods, and to determine the relative contribution of atmospheric pollutants to pollutant loadings. For purposes of this subsection, "coastal waters" shall mean estuaries selected pursuant to section 320(a)(2)(A) of the Federal Water Pollution Control Act [33 U.S.C. 1330(a)(2)(A)] or listed pursuant to section 320(a)(2)(B) of such Act [33 U.S.C. 1330(a)(2)(B)] or estuarine research reserves designated pursuant to section 1461 of title 16.

(5) Report

Within 3 years of November 15, 1990, and biennially thereafter, the Administrator, in cooperation with the Under Secretary of Commerce for Oceans and Atmosphere, shall submit to the Congress a report on the results of any monitoring, studies, and investigations conducted pursuant to this subsection. Such report shall include, at a minimum, an assessment of—

(A) the contribution of atmospheric deposition to pollution loadings in the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters;

(B) the environmental and public health effects of any pollution which is attributable to atmospheric deposition to the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters;

(C) the source or sources of any pollution to the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters which is attributable to atmospheric deposition;

(D) whether pollution loadings in the Great Lakes, the Chesapeake Bay, Lake Champlain or coastal waters cause or contribute to exceedances of drinking water standards pursuant to the Safe Drinking Water Act [42 U.S.C. 300f et seq.] or water quality standards pursuant to the Federal Water Pollution Control Act [33 U.S.C. 1251 et seq.] or, with respect to the Great Lakes, exceedances of the specific objectives of the Great Lakes Water Quality Agreement; and

(E) a description of any revisions of the requirements, standards, and limitations pursuant to this chapter and other applicable Federal laws as are necessary to assure protection of human health and the environment.

(6) Additional regulation

As part of the report to Congress, the Administrator shall determine whether the other provisions of this section are adequate to prevent serious adverse effects to public health and serious or widespread environmental effects, including such effects resulting from indirect exposure pathways, associated with atmospheric deposition to the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters of hazardous air pollutants (and their atmospheric transformation products). The Administrator shall take into consideration the tendency of such pollutants to bio-

accumulate. Within 5 years after November 15, 1990, the Administrator shall, based on such report and determination, promulgate, in accordance with this section, such further emission standards or control measures as may be necessary and appropriate to prevent such effects, including effects due to bioaccumulation and indirect exposure pathways. Any requirements promulgated pursuant to this paragraph with respect to coastal waters shall only apply to the coastal waters of the States which are subject to section 7627(a) of this title.

(n) Other provisions

(1) Electric utility steam generating units

(A) The Administrator shall perform a study of the hazards to public health reasonably anticipated to occur as a result of emissions by electric utility steam generating units of pollutants listed under subsection (b) of this section after imposition of the requirements of this chapter. The Administrator shall report the results of this study to the Congress within 3 years after November 15, 1990. The Administrator shall develop and describe in the Administrator's report to Congress alternative control strategies for emissions which may warrant regulation under this section. The Administrator shall regulate electric utility steam generating units under this section, if the Administrator finds such regulation is appropriate and necessary after considering the results of the study required by this subparagraph.

(B) The Administrator shall conduct, and transmit to the Congress not later than 4 years af-

ter November 15, 1990, a study of mercury emissions from electric utility steam generating units, municipal waste combustion units, and other sources, including area sources. Such study shall consider the rate and mass of such emissions, the health and environmental effects of such emissions, technologies which are available to control such emissions, and the costs of such technologies.

(C) The National Institute of Environmental Health Sciences shall conduct, and transmit to the Congress not later than 3 years after November 15, 1990, a study to determine the threshold level of mercury exposure below which adverse human health effects are not expected to occur. Such study shall include a threshold for mercury concentrations in the tissue of fish which may be consumed (including consumption by sensitive populations) without adverse effects to public health.

[CONTENT OMITTED]

(r) Prevention of accidental releases

(1) Purpose and general duty

It shall be the objective of the regulations and programs authorized under this subsection to prevent the accidental release and to minimize the consequences of any such release of any substance listed pursuant to paragraph (3) or any other extremely hazardous substance. The owners and operators of stationary sources producing, processing, handling or storing such substances have a general duty in the same manner and to the same extent as section 654 of title 29 to identify hazards which may result from such releases us-

ing appropriate hazard assessment techniques, to design and maintain a safe facility taking such steps as are necessary to prevent releases, and to minimize the consequences of accidental releases which do occur. For purposes of this paragraph, the provisions of section 7604 of this title shall not be available to any person or otherwise be construed to be applicable to this paragraph. Nothing in this section shall be interpreted, construed, implied or applied to create any liability or basis for suit for compensation for bodily injury or any other injury or property damages to any person which may result from accidental releases of such substances.

[CONTENT OMITTED]

(s) Periodic report

Not later than January 15, 1993 and every 3 years thereafter, the Administrator shall prepare and transmit to the Congress a comprehensive report on the measures taken by the Agency and by the States to implement the provisions of this section. The Administrator shall maintain a database on pollutants and sources subject to the provisions of this section and shall include aggregate information from the database in each annual report. The report shall include, but not be limited to—

(1) a status report on standard-setting under subsections (d) and (f) of this section;

(2) information with respect to compliance with such standards including the costs of compliance experienced by sources in various categories and subcategories;

(3) development and implementation of the national urban air toxics program; and

(4) recommendations of the Chemical Safety and Hazard Investigation Board with respect to the prevention and mitigation of accidental releases.

[CONTENT OMITTED]

REFERENCES IN TEXT

The date of enactment, referred to in subsec. (a)(11), probably means the date of enactment of Pub. L. 101–549, which amended this section generally and was approved Nov. 15, 1990.

The Atomic Energy Act, referred to in subsec. (d)(9), probably means the Atomic Energy Act of 1954, act Aug. 1, 1946, ch. 724, as added by act Aug. 30, 1954, ch. 1073, §1, 68 Stat. 921, and amended, which is classified generally to chapter 23 (§2011 et seq.) of this title. For complete classification of this Act to the Code, see Short Title note set out under section 2011 of this title and Tables.

The Federal Water Pollution Control Act, referred to in subsecs. (e)(5) and (m)(1)(D), (5)(D), is act June 30, 1948, ch. 758, as amended generally by Pub. L. 92–500, §2, Oct. 18, 1972, 86 Stat. 816, which is classified generally to chapter 26 (§1251 et seq.) of Title 33, Navigation and Navigable Waters. Title II of the Act is classified generally to subchapter II (§1281 et seq.) of chapter 26 of Title 33. For complete classification of this Act to the Code, see Short Title note set out under section 1251 of Title 33 and Tables.

The Toxic Substances Control Act, referred to in subsec. (k)(3)(C), is Pub. L. 94–469, Oct. 11, 1976, 90

Stat. 2003, as amended, which is classified generally to chapter 53 (§2601 et seq.) of Title 15, Commerce and Trade. For complete classification of this Act to the Code, see Short Title note set out under section 2601 of Title 15 and Tables.

The Federal Insecticide, Fungicide and Rodenticide Act, referred to in subsec. (k)(3)(C), probably means the Federal Insecticide, Fungicide, and Rodenticide Act, act June 25, 1947, ch. 125, as amended generally by Pub. L. 92–516, Oct. 21, 1972, 86 Stat. 973, which is classified generally to subchapter II (§136 et seq.) of chapter 6 of Title 7, Agriculture. For complete classification of this Act to the Code, see Short Title note set out under section 136 of Title 7 and Tables.

The Resource Conservation and Recovery Act, referred to in subsec. (k)(3)(C), probably means the Resource Conservation and Recovery Act of 1976, Pub. L. 94–580, Oct. 21, 1976, 90 Stat. 2796, as amended, which is classified generally to chapter 82 (§6901 et seq.) of this title. For complete classification of this Act to the Code, see Short Title of 1976 Amendment note set out under section 6901 of this title and Tables.

The Safe Drinking Water Act, referred to in subsec. (m)(1)(D), (5)(D), is title XIV of act July 1, 1944, as added Dec. 16, 1974, Pub. L. 93–523, §2(a), 88 Stat. 1660, as amended, which is classified generally to subchapter XII (§300f et seq.) of chapter 6A of this title. For complete classification of this Act to the Code, see Short Title note set out under section 201 of this title and Tables.

The Solid Waste Disposal Act, referred to in subsec. (n)(7), is title II of Pub. L. 89–272, Oct. 20, 1965, 79 Stat. 997, as amended generally by Pub. L. 94–580, §2, Oct. 21, 1976, 90 Stat. 2795. Subtitle C of the Act is classified generally to subchapter III (§6921 et seq.) of chapter 82 of this title. For complete classification of this Act to the Code, see Short Title note set out under section 6901 of this title and Tables.

Section 303 of the Clean Air Act Amendments of 1990, referred to in subsec. (o)(4), probably means section 303 of Pub. L. 101–549, which is set out below.

The Clean Air Act Amendments of 1990, referred to in subsec. (q)(1)–(3), probably means Pub. L. 101–549, Nov. 15, 1990, 104 Stat. 2399. For complete classification of this Act to the Code, see Short Title note set out under section 7401 of this title and Tables.

The Emergency Planning and Community Right-To-Know Act of 1986, referred to in subsec. (r)(3), is title III of Pub. L. 99–499, Oct. 17, 1986, 100 Stat. 1728, which is classified generally to chapter 116 (§11001 et seq.) of this title. For complete classification of this Act to the Code, see Short Title note set out under section 11001 of this title and Tables.

The Occupational Safety and Health Act, referred to in subsec. (r)(6)(C)(ii), (K), (L), probably means the Occupational Safety and Health Act of 1970, Pub. L. 91–596, Dec. 29, 1970, 84 Stat. 1590, as amended, which is classified principally to chapter 15 (§651 et seq.) of Title 29, Labor. For complete classification of this Act to the Code, see Short Title note set out under section 651 of Title 29 and Tables.

[CONTENT OMITTED]

APPENDIX E

EPA's Responses to Public Comments on EPA's *National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units*

December 2011

Volume 1 of 2

[CONTENT OMITTED]

CHAPTER 1: LEGAL – GENERAL/APPROPRIATE AND NECESSARY FINDING/REQUEST FOR EXTENSION OF COMMENT PERIOD/OTHER

[CONTENT OMITTED]

1B – Legal aspects of Appropriate and Necessary Finding

Note: Many legal comments on the Appropriate and Necessary Finding are contained and addressed in the preamble to the final rule.

1. Interpretation of "appropriate and necessary."

Commenters: 17775, 18500, 17774, 17696, 17840, 18033, 17391, 17718, 17623, 17732, 17716, 17712, 17723, 17765, 17886, 19114, 17884, 18023, 19536/19537/19538

[CONTENT OMITTED]

b. Commenters disagreeing with the EPA's interpretation that 112(n)(1) allows consideration

of both public health and environmental effects.

[CONTENT OMITTED]

Comment 35: Several commenters (17731, 17716, 17834) state that the EPA takes inconsistent positions regarding how the statute should be interpreted. The commenters state that on one hand the EPA contends that the limited reference to "environmental effects of such [i.e., mercury] emissions" in (n)(l)(B) can be transformed into a general requirement that environmental effects of all HAP emissions can be considered under the (n)(l)(A) "appropriate" finding, while on the other hand, the EPA contends that costs cannot be considered in making that finding because "nowhere in CAA section 112(n)(l) does Congress require the consideration of costs in assessing health and environmental impacts. The commenters state that the only reference to costs is in CAA section 112(n)(l)(B) and that reference required the agency to consider the costs of emission reduction controls for Hg." Fed Reg. at 24987. According to the commenters, the only reference to "environmental effects" is in CAA section 112(n)(l)(B), and that reference requires the EPA to consider those effects only for Hg. Thus, the EPA's explanation does not justify treating costs one way (excluded) and environmental effects another way (included).

Comment 36: Commenter 17834 states that the EPA utilizes an illogical approach to the "appropriate and necessary" determination. On the same page of the proposed rule, states the commenter, the EPA first reasons that, with respect to CAA section 112(n)(1)(A), the absence of language expressly precluding the consideration of environmental effects

provides the EPA with discretion to take such effects into account; however, the absence of language expressly authorizing the consideration of costs prohibits the EPA from taking costs into account. Regarding both environmental effects and costs, the EPA draws its authority, or lack thereof, from 112(n)(1)(B).

Response to Comments 35 and 36: Commenters are correct that CAA section 112(n)(1)(B) references both environmental effects and costs of controls, but we maintain it was reasonable to consider adverse environmental effects and not costs in determining whether it is appropriate and necessary to regulate HAP emissions from EGUs under CAA section 112. The agency is not required to and does not consider costs in any listing decisions and we maintain that approach is consistent with the purpose of CAA section 112. Congress also did not authorize the agency to consider costs in any delisting decisions. On the other hand, protection of the environment is a goal of the CAA generally and CAA section 112 specifically, see CAA section 112(a)(7) ("defining adverse environmental effects"), such that it would be unreasonable to ignore environmental hazards associated with HAP emissions from EGUs when assessing whether to regulate EGUs under CAA section 112. Congress also specifically called for the EPA to assess environmental impacts in deciding whether to delist source categories and thus it is reasonable to consider such impacts in assessing whether to regulate EGUs under CAA section 112. Commenters do not and cannot state that the agency must consider costs in determining whether regulation of EGUs under CAA section 112 is appropriate and necessary, especially where, as here, hazards to public health and the environment are at issue.

Thus, although the EPA could have interpreted the term "appropriate" to allow for the consideration of costs, it reasonably declined to do so. Its approach is wholly consistent with the structure of CAA section 112, which does not contemplate consideration of costs in either listing or delisting decisions. Moreover, once listed, Congress precluded the agency from considering cost in setting MACT floors, which are technology-based standards. It is hard to imagine that Congress wanted the agency to consider costs in assessing whether to regulate EGUs, but then to ignore such costs in setting emission standards. We continue to believe that had Congress sought to require the consideration of costs in CAA section 112(n)(1)(A), it would have so stated.

[CONTENT OMITTED]

APPENDIX F

BEFORE THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FROM COAL- AND OIL-FIRED ELECTRIC UTILITY STEAM GENERATING UNITS

Docket EPA-HQ-OAR-2009-0234

COMMENTS OF THE UTILITY AIR REGULATORY GROUP

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August 4, 2011

[CONTENT OMITTED]

V. The RIA Vastly Overstates the Benefits of the EGU MACT Rule and Understates the Costs of That Rule

[CONTENT OMITTED]

C. Alternative Modeling of Compliance with the Proposed MACT Limits Shows That the RIA Has Not Fully Accounted for the Effects of the Proposed Rule

Several UARG members commissioned ICF to conduct IPM modeling runs using more realistic assumptions about the control technologies that would need to be installed to meet the proposed MACT limits.[313] One of the purposes of this ICF modeling was to evaluate the consequences of EPA's decision to regulate all HAPs instead of just mercury – the one HAP for which EPA has made a health finding. The modeling involved three different runs. A reference case was run assuming CAIR was implemented in 25 states and the District of Columbia. One sensitivity run assumed that the proposed Transport Rule would be implemented along with a MACT rule that only limited mercury emissions to the levels proposed by EPA. The other sensitivity run used the same assumptions as the first sensitivity run except the MACT standards covered all HAPs as EPA has proposed.

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[313] ICF, HAPs MACT Analysis (July 1, 2011) (Attachment 15).

The results of these runs show that regulation of the non-mercury HAPs adds approximately $10.5 billion to the total system costs in the first year of compliance, over $8 billion annually in the following years, and by 2030 the compliance cost difference is projected at more than $9 billion annually. Relative to the reference case, EPA's proposed MACT rule together with the proposed Transport Rule adds $22.2 billion to total system costs in 2015, $21.1 billion by 2020 and $25.7 billion annually by 2030.

A comparison of a mercury-only MACT rule to an all-HAPs MACT rule shows an additional $30 billion in overnight capital expenditures for additional pollution control equipment and an additional $13 billion in overnight capital expenditures for new capacity additions. An all-HAPs rule results in 5 GW of additional plant retirements over a mercury-only rule.

The American Coalition for Clean Coal Electricity ("ACCCE") had National Economic Research Associates ("NERA") model the combined economic impacts of the proposed Transport Rule and the proposed EGU MACT rule. Using a different suite of models, NERA found that the nationwide average retail electric price is projected to increase by 11.5 percent, and in regions affected by the proposed Transport Rule, prices are projected to increase by 12.2 to 23.5 percent. Almost 48 GW of coal-fired electric generating capacity – 15% of the U.S. coal fleet – was projected to retire. Nationwide net employment losses total 1.44 million job-years by 2020.

This work shows that the RIA underestimates the cost impacts of the proposed EGU MACT rule, in

part, because of unrealistic assumptions made about the effectiveness of DSI. The modeling also shows that EPA seeks to impose tens of billions in additional costs on the electric utility industry by setting standards for non-mercury HAPs that will not result in any measureable health benefits from reducing emissions of those HAPs.

[CONTENT OMITTED]

APPENDIX G

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 60 and 63

[EPA-HQ-OAR-2009-0234; EPA-HQ-OAR-2011-0044, FRL-9286-1]

RIN 2060-AP52

National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units

AGENCY: Environmental Protection Agency.

ACTION: Proposed rule.

SUMMARY: The United States (U.S.) Environmental Protection Agency (EPA or Agency) is proposing national emission standards for hazardous air pollutants (NESHAP) from coal- and oil-fired electric utility steam generating units (EGUs) under Clean Air Act (CAA or the Act) section 112(d) and proposing revised new source performance standards (NSPS) for fossil fuel-fired EGUs under CAA section 111(b). The proposed NESHAP would protect air quality and promote public health by reducing emissions of the hazardous air pollutants (HAP) listed in CAA section 112(b). In addition, these proposed amendments to the NSPS are in response to a voluntary remand of a final rule. We also are proposing several minor amendments, technical clarifications, and corrections to existing NSPS provisions for fossil fuel-fired EGUs

and large and small industrial-commercial-institutional steam generating units.

[CONTENT OMITTED]

III. Appropriate and Necessary Finding

As required by the CAA, we determined in December 2000, and confirm that finding here, that it is appropriate to regulate emissions of Hg and other HAP from EGUs because manmade emissions of those pollutants pose hazards to public health and the environment, and EGUs are the largest or among the largest contributors of many of those HAP. It is necessary to do so for a variety of reasons, including that hazards to public health and the environment from EGUs remain after imposition of the requirements of the CAA.

In this section, we address the Agency's determination that it is appropriate and necessary to regulate coal- and oil-fired EGUs under CAA section 112. We first provide our interpretation of the critical terms in CAA section 112(n)(1). As shown below, these interpretations are wholly consistent with the CAA and the December 2000 Finding. We then demonstrate that the December 2000 Finding was valid at the time it was made based on the information available to the Agency at that time. Finally, we explain that, although not required, we recently conducted additional technical analyses given that several years have passed since the December 2000 Finding was issued. Those analyses include both a quantitative and qualitative assessment of the hazards to public health and a qualitative analysis of hazards to the environment associated with Hg and non-Hg HAP from EGUs. The analyses confirm that

it remains appropriate and necessary today to regulate EGUs under CAA section 112. We also explain why these analyses and the other information currently before the Agency confirm that regulation of EGUs under section 112 is appropriate and necessary. Accordingly, such units are properly listed pursuant to section 112(c).

A. Regulating EGUs Under CAA Section112

CAA section 112(n)(1)(A) requires the Agency to regulate EGUs under section 112 "if the Administrator finds such regulation is *appropriate* and *necessary* after considering the results of the [Utility Study]." (*emphasis added*). Congress did not define the phrase "appropriate and necessary" in section 112(n)(1)(A). Rather, Congress expressly delegated to the Agency the authority to interpret and apply those terms. See *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 843–44 (1984) (the Agency's interpretation of statutory terms is entitled to considerable deference as long as it is a reasonable reading of the statute).

Courts have interpreted the terms "appropriate" and "necessary" in other provisions of the CAA and other statutes, and concluded that those terms convey upon the Agency a wide degree of discretion. *See, e.g., National Association of Clean Air Act Agencies v. EPA*, 489 F.3d 1221, 1229 (DC Cir. 2007) (finding "both explicit and extraordinarily broad" the Administrator's authority under CAA section 231(a)(3) to "issue regulations with such modifications as he deems appropriate.") (*emphasis in original*); *see also Cellular Telecommunications & Internet Association, et al. v. FCC*, 330 F.3d 502, 510 (DC Cir. 2003), (finding that "[c]ourts have frequently interpreted the

word 'necessary' to mean less than absolutely essential, and have explicitly found that a measure may be 'necessary' even though acceptable alternatives have not been exhausted." (quoting *Natural Res. Def. Council v. Thomas*, 838 F.2d 1224, 1236 (DC Cir. 1998) (internal quotation marks omitted)).

We evaluate the terms "appropriate" and "necessary" within the statutory context in which they appear to determine the meaning of the words. *See Cellular Telecommunications*, 330 F.3d at 510 (finding that "it is crucial to understand the context in which the word [necessary] is used in order to comprehend its meaning.") (citations omitted). In this case, we look for guidance in section 112 generally, and focus specifically on section 112(n)(1), which addresses EGUs.

1. Statutory Framework for Evaluating EGUs

As explained above, Congress, concerned by the slow pace of EPA's regulation of HAP, "altered section 112 by eliminating much of EPA's discretion in the process." *New Jersey*, 517 F.3d at 578 (citations omitted). We describe above the two-phased approach to standard setting. Also, relevant, however, is that Congress set very strict deadlines for listing source categories and issuing emission standards for such categories. *See e.g.*, Section 112(c)(6). 112(e)(1); *New Jersey*, 517 F.3d at 578 (noting that "EPA was required to list and to regulate, on a prioritized schedule" all categories and subcategories of major and area sources). Thus, in substantially amending section 112 of the CAA in 1990, Congress sought prompt and permanent reductions of HAP emissions from stationary sources—first through technology-based standards, and then further, as necessary, through

risk-based standards designed to protect human health and the environment.

Congress' focus on protecting public health and the environment from EGU HAP emissions is reflected in section 112(n)(1), titled "[e]lectric utility steam generating units." That section directs EPA to evaluate HAP emissions from EGUs. In addition to directing EPA to regulate EGUs under section 112 if it determines that it is appropriate and necessary to do so, section 112(n)(1) requires the completion of three studies related to HAP emissions from EGUs. Those studies include: (1) The Utility Study pursuant to section (n)(1)(A); (2) the Mercury Study pursuant to section (n)(1)(B); and (3) the NIEHS Study (NAS Study) pursuant to section 112(n)(1)(C).[11]

These studies are described above, in detail. In summary, for the Utility Study, Congress required EPA to evaluate the hazards to public health that are reasonably anticipated to occur as the result of EGU emissions following imposition of the requirements of the CAA. Congress also directed EPA to identify alternative control strategies for those HAP that may warrant regulation under section 112.

The Mercury Study required by section 112(n)(1)(B) is both broader and narrower in scope, as compared to the Utility Study. For example, the

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[11] As explained above, the NAS Study studied the same issues Congress wanted addressed pursuant to section 112(n)(1)(C) and, because it was conducted five years after the NIEHS study, it was a more comprehensive study accounting for new information not available to NIEHS. Congress directed both studies and wanted EPA to consider the NAS Study before issuing the appropriate and necessary finding so we are reasonably focusing our discussion on the content of the later study.

Mercury Study is narrower in scope, in that it focuses solely on the impacts from Hg emissions, as opposed to all HAP. The Mercury Study is broader in scope, however, in two important respects. First, Congress required EPA to consider environmental effects in addition to health effects. Second, Congress required the Agency to consider the cumulative effects of Hg from all sources, including EGUs. In considering the cumulative effects of Hg, the Agencywas not required to apportion the cause of any adverse effects among the various sources of Hg. Both the Utility and Mercury Studies considered the control technologies available to control Hg emissions, but only the Mercury Study called for the evaluation of the costs of such controls. Section 112(n)(1)(B).

EPA believes that Congress directed the Agency to conduct the Utility Study so that the Agency would understand the hazards to public health posed by HAP emissions from EGUs alone, and consider whether any hazards that were identified would be addressed through imposition of the requirements of the CAA applicable to EGUs at that time. Congress provided EPA an additional year to examine the impacts of EGU emissions of Hg on health and the environment in combination with other sources of Hg emissions.

The NAS Study required by section 112(n)(1)(C), which was due at the same time as the Utility Study, was to focus on Hg only and the adverse human health effects associated with Hg. The statute directed the determination of the threshold level of Hg below which adverse effects to human health are not expected to occur. The statute further directed the determination of the threshold for Hg concentrations

in the tissue of fish which may be consumed, including by sensitive populations, without adverse effects to public health. Here, unlike the Utility Study and the Mercury Study, the statute specifically requires an evaluation of the adverse human health effects of Hg on sensitive populations.

The remaining critical element of section 112(n)(1) is the direction to EPA to determine whether it is appropriate and necessary to regulate EGUs under section 112, considering the results of the Utility Study. Although the Utility Study is a condition precedent to making the appropriate and necessary determination, nothing in section 112(n)(1)(A) precludes the Agency from considering other information in making that determination. Taken together, we believe these provisions provide a framework for the Agency's determination of whether to regulate HAP emissions from EGUs under section 112. Through these provisions, Congress sought a prompt review and evaluation of the hazards to public health and the environment associated with Utility HAP emissions. This prompt consideration of health and environmental impacts is consistent with the strict deadlines Congress imposed in section 112 on all other source categories. *See infra.*

Section 112(n)(1)(B) is direct evidence that Congress was concerned with environmental effects and cumulative impacts of HAP emissions from EGUs and other sources, particularly with regard to the bioaccumulative HAP Hg. Section 112(n)(1)(C) provides further evidence that Congress was concerned with limiting HAP emissions from EGUs to a level that protects sensitive populations. We believe the scope of the Utility Study was limited to HAP emissions

from EGUs and hazards to public health, not because Congress was unconcerned with adverse environmental effects or the cumulative impact of HAP emissions, but because the Utility Study, as required, was a significant undertaking in itself and Congress wanted the Agency to complete the study within 3 years. Thus, section 112(n)(1) reveals, among other things, Congress' concern for the health and environmental effects of HAP emissions from EGUs, both alone and in conjunction with other sources, the impact of Hg emissions from EGUs, and the availability of controls to address HAP emissions from EGUs.

Finally, significantly, nowhere in section 112(n)(1) does Congress require the consideration of costs in assessing health and environmental impacts. The only reference to costs is in section 112(n)(1)(B) and that reference required the Agency to consider the costs of emission reduction controls for Hg.

2. Interpretation of Key Terms

Section 112(n)(1)(A) itself provides no clear standard to govern EPA's analysis and determination of whether it is "appropriate and necessary" to regulate utilities under section 112. The statute simply requires EPA to regulate EGUs under section 112 if it determines that such regulation is appropriate and necessary, after considering the results of the Utility Study. As noted above, courts have interpreted the terms appropriate and necessary as conveying considerable discretion to the Agency in determining what is appropriate and necessary in a given context.

As explained more fully below, in this context, we interpret the statute to require the Agency to find it *appropriate* to regulate EGUs under CAA section 112

if the Agency determines that the emissions of one or more HAP emitted from EGUs pose an identified or potential hazard to public health or the environment at the time the finding is made. If the Agency finds that it is *appropriate* to regulate, it must find it *necessary* to regulate EGUs under section 112 if the identified or potential hazards to public health or the environment will not be adequately addressed by the imposition of the requirements of the CAA. Moreover, it may be *necessary* to regulate utilities under section 112 for a number of other reasons, including, for example, that section 112 standards will assure permanent reductions in EGU HAP emissions, which cannot be assured based on other requirements of the CAA.

The following subsections describe in detail our interpretation of the key statutory terms. We also explain below how the interpretations set forth in this notice are wholly consistent with the December 2000 Finding. Further, to the extent our interpretation differs from that set forth in the 2005 Action, we explain the basis for that difference and why the interpretation, as set forth in this preamble, is reasonable. *See National Cable & Telecommunications Ass'n, et al. v. Brand X Internet Services, et al.*, 545 U.S. 967, 981 (2005) (Discussing the deference provided to an Agency when changing interpretations the Court stated "change is not invalidating, since the whole point of *Chevron* deference is to leave the discretion provided by ambiguities of a statute with the implementing agency.") (Internal citations and quotations omitted); *see* also *Department of Treasury v. FLRA*, 494 U.S. 922, 933 (1990) (Finding that EPA's judgment should only be overturned if it is

deemed unreasonable, not merely because other, reasonable alternatives exist).

a. "Appropriate" To Regulate EGUs

We interpret section 112(n)(1)(A) to require the Agency to find regulation of EGUs under section 112 appropriate if we determine that HAP emissions from EGUs pose a hazard to public health or the environment at the time the finding is made. The hazard to public health or the environment may be the result of HAP emissions from EGUs alone or the result of HAP emissions from EGUs in conjunction with HAP emissions from other sources. In addition, EPA must find that it is appropriate to regulate EGUs if it determines that any single HAP emitted by utilities poses a hazard to public health or the environment. We further interpret the term "appropriate" to not allow for the consideration of costs in assessing whether HAP emissions from EGUs pose a hazard to public health or the environment. Finally, we may conclude that it is appropriate, in part, to regulate EGUs if we determine that there are controls available to address HAP emissions from EGUs.

i. Basis for Interpretation

As stated above, the appropriate finding may be based on hazards to public health or the environment. Although we believe that Congress' primary concern, as expressed in section 112(n)(1)(A) and 112(n)(1)(C), related to hazards to public health, the inclusion of environmental effects in section 112(n)(1)(B) indicates Congress' interest in protecting the environment from HAP emissions from EGUs as well.

Moreover, the term "appropriate" is extremely broad and nothing in the statute suggests that the Agency should ignore adverse environmental effects in determining whether to regulate EGUs under section 112. Further, had Congress intended to prohibit EPA from considering adverse environmental effects in the "appropriate" finding, it would have stated so expressly. Absent clear direction to the contrary, and considering the purpose of the CAA (*see e.g.*, CAA section 101, 112(c)(9)(B)(ii)), it is reasonable to consider environmental effects in evaluating the hazards posed by HAP emitted from EGUs when assessing whether regulation of EGUs under section 112 is appropriate. Accordingly, we interpret the statute to authorize the Agency to base the appropriate finding on either hazards to public health or the environment.

We also maintain that the Agency should base its "appropriate" evaluation on the hazards to public health or the environment that exist at the time the determination is made, not after considering the imposition of the other requirements of the CAA. The Agency evaluates whether imposition of the requirements of the CAA will adequately address any identified hazards only in the context of the necessary finding. Thus, in assessing whether regulation of EGUs is appropriate under section 112, we evaluate the current hazards posed by such units, as opposed to projecting what such hazards may look like after imposition of the requirements of the CAA.

We further interpret the CAA as allowing the Agency to base the appropriate finding on hazards to public health or the environment that result from HAP emissions from EGUs alone or hazards to public

health and the environment that result from HAP emissions from EGUs in conjunction with HAP emissions from other sources. Section 112(n)(1) does not focus exclusively on EGU-only HAP emissions.

As explained above, section 112(n)(1)(B) and (C) require either expressly or implicitly the consideration of Hg emissions from all sources, not just EGUs. Section 112(n)(1)(B) is of note because that provision does not require the Agency to determine the hazard posed by Hg from EGUs alone. Rather, Congress required EPA to evaluate the health and environmental effects of Hg emissions from "electric utility steam generating units, municipal waste combustion units, and other sources, including area sources." Section 112(n)(1)(C) is also relevant because it requires a human health-based assessment of the hazards posed by Hg without regard to the origin of the Hg. Congress could have directed an evaluation of the human health risk attributable to EGUs alone, but it did not. Congress also did not require such an assessment be conducted in the NAS Study.

In addition, Congress directed the Agency in section 112(n)(1)(A) to regulate EGUs under section 112 if the results of the Utility Study caused the Agency to conclude that regulation was appropriate and necessary. Section 112(n)(1)(A) is not written in a manner to preclude consideration of other information when determining whether it is appropriate and necessary to regulate EGUs under section 112, and that includes consideration of all hazards, both health and environmental, posed by HAP emitted by EGUs. *See United States v. United Technologies Corp.*, 985 F.2d 1148, 1158 (2d Cir. 1993) ("based upon" does not mean "solely").

Finally, focusing on HAP emissions from EGUs alone when making the appropriate finding ignores the manner in which public health and the environment are affected by air pollution. An individual that suffers adverse health effects as the result of the combined HAP emissions from EGUs and other sources is harmed, irrespective of whether HAP emissions from EGUs alone would cause that harm. For this reason, we believe we may consider the hazards to public health and the environment posed by HAP emissions from EGUs alone or in conjunction with HAP emissions from other sources.

Furthermore, the appropriate finding may be based on a finding that any single HAP emitted from EGUs poses a hazard to public health or the environment. Nothing in section 112(n)(1)(A) suggests that EPA must determine that every HAP emitted by EGUs poses a hazard to public health or the environment before EPA can find it appropriate to regulate EGUs under section 112. Interpreting the statute in this manner would preclude the Agency from addressing under section 112 identified or potential hazards to public health or the environment associated with HAP emissions from EGUs unless we found a hazard existed with respect to each and every HAP emitted.

Indeed, Congress' focus in section 112(n)(1)(B) and (C) on Hg indicates Congress' awareness that Hg was a problem and supports the position that EPA could find it appropriate to regulate EGUs based on the adverse health and environmental effects of a single HAP. Furthermore, the statute does not directly or expressly authorize the Agency to regulate only those HAP for which a hazard finding has been made. In

fact, the statute requires the Agency to regulate EGUs under section 112 if the Agency finds regulation under section 112 is appropriate and necessary, and regulation under section 112 for major sources requires MACT standards for *all HAP* emitted from the source category. *See, e.g., National Lime Ass'n v. EPA*, 233 F.3d 625, 633 (DC Cir. 2000). For these reasons, we conclude we must find it appropriate to regulate EGUs under section 112 if we determine that the emissions of any single HAP from such units pose a hazard to public health or the environment.

We also maintain that the better reading of the term "appropriate" is that it does not allow for the consideration of costs in assessing whether hazards to public health or the environment are reasonably anticipated to occur based on EGU emissions. Had Congress intended to require the Agency to consider costs in assessing hazards to public health or the environment associated with EGU HAP emissions, it would have so stated.

This interpretation is consistent with the overall structure of the CAA. Congress did not authorize the consideration of costs in listing any source categories for regulation under section 112. In addition, Congress did not permit the consideration of costs in evaluating whether a source category could be delisted pursuant to the provisions of section 112(c)(9).

Under section 112(n)(1)(A), EPA is evaluating whether to regulate HAP emissions from EGUs at all. It is reasonable to conclude that costs may not be considered in determining whether to regulate EGUs under section 112 when hazards to public health and the environment are at issue.

Finally, consistent with sections 112(n)(1)(A) and 112(n)(1)(B), we conclude that we may base the appropriate finding on the availability of controls to address HAP emissions from EGUs.

ii. The December 2000 Finding

The Agency's interpretation of the term "appropriate," as set forth above, is wholly consistent with the Agency's appropriate finding in December 2000. As noted above, in 2000, we concluded that it was appropriate to regulate EGUs under section 112 because Hg in the environment posed a hazard to public health and the environment. The Agency also concluded it was appropriate because of uncertainties associated with the hazards posed by other HAP emitted from EGUs. 65 FR 79827. Finally, the EPA concluded that it was appropriate because of the availability of controls to reduce HAP emissions from EGUs. In making the finding as it related to Hg, the Agency considered the hazards posed by Hg in the environment and the contribution of EGUs to that hazard. In addition, EPA did not consider costs when making the appropriate determination. Further, the appropriate finding evaluated the hazards at the time, as opposed to the hazards remaining after imposition of the requirements of the CAA. EPA evaluated whether the other requirements of the CAA would adequately address the hazards in the necessary prong only.[12]

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[12] As explained below, EPA reasonably concluded in December 2000 that it was appropriate and necessary to regulate EGUs under section 112 based on the record before the Agency at that time.

iii. The 2005 Action

As noted above, in 2005, EPA revised its December 2000 Finding and stated that the appropriate finding: (1) Could not be based on adverse environmental effects; (2) must be made considering only HAP emissions from EGUs; (3) must be made after consideration of the imposition of the requirements of the CAA; and (4) must consider other factors (*e.g.*, costs) even if we determine that HAP emissions from EGUs pose a hazard to public health. This proposal differs from the 2005 Action, and we address each of these differences below.

First, we change the position taken in 2005 that the appropriate finding could not be based on environmental effects alone. In 2005, we did not properly consider all of the provisions of section 112(n)(1). The Agency should not interpret the CAA to limit the Agency's discretion to protect the environment absent clear direction to that effect. In essence, the Agency's interpretation in 2005 would have required the Agency to ignore a catastrophic environmental harm (*e.g.*, the extinction of a species) if the Agency could not also identify a hazard to public health. EPA took this position regarding environmental effects in 2005 even though in that same rule it correctly interpreted section 112(n)(1)(A) to allow the Agency to consider information beyond the Utility Study in making the appropriate and necessary determination. 70 FR 15,997–99. The 2005 interpretation that EPA cannot consider environmental effects in evaluating whether it is appropriate to regulate EGUs under section 112 was neither reasonable nor consistent with the goals of the CAA, and, therefore, we are rejecting that in-

terpretation and returning to the approach taken in 2000 that allowed consideration of environmental effects.

Second, for all of the reasons stated above, we are revisiting the 2005 interpretation that required the Agency to consider HAP emissions from EGUs without considering the cumulative impacts of all sources of HAP emissions. Nothing in section 112(n)(1)(A) prohibits consideration of HAP emissions from EGUs in conjunction with HAP emissions from other sources of HAP. We believe it is more reasonable to interpret the statute to authorize the Agency to consider the cumulative effects of HAP that are emitted from EGUs and other sources. This interpretation allows the Agency to evaluate more fully whether HAP emissions from EGUs pose a hazard to public health or the environment consistent with the manner in which the public and the environment are exposed to HAP emissions.

Third, we are revising the 2005 interpretation that required the Agency to evaluate the hazards to public health after imposition of the requirements of the CAA. We conclude today that in 2005 the Agency improperly conflated the appropriate finding and the necessary finding by requiring consideration of the ameliorative effects of other CAA requirements in both prongs of the appropriate and necessary finding. We believe the Agency must find it appropriate to regulate EGUs under section 112 if we determine that HAP emitted by EGUs pose a hazard to public health or the environment at the time the finding is made. The issue of how and whether those hazards are reduced after imposition of the requirements of

the CAA is an issue for the necessary prong of the finding.

Finally, we are rejecting the 2005 interpretation that authorizes the Agency to consider other factors (*e.g.*, cost), even if the Agency determines that HAP emitted by EGUs pose a hazard to public health (or the environment). We reject the consideration of costs for all the reasons set forth above. Furthermore, the better reading of section 112(n)(1)(A) is that the Agency should find it appropriate to regulate EGUs under section 112 if a hazard to public health or the environment is identified. We think it unreasonable to decline to make the appropriate finding based on any factor, cost or otherwise, if we determine that EGUs pose a hazard to public health or the environment.

[CONTENT OMITTED]

For all the reasons above, we believe it is appropriate to regulate EGUs under section 112 if the Agency determines that HAP emissions from such units pose a hazard to public health or the environment at the time of the finding, and it is necessary to regulate EGUs under section 112 if the imposition of the other requirements of the CAA will not adequately address the identified hazards to public health or the environment, or there are other compelling reasons making it necessary to regulate HAP emissions from EGUs under section 112.

[CONTENT OMITTED]

D. New Analyses Confirm That it Remains Appropriate and Necessary to Regulate U.S. EGU HAP Under Section 112

[CONTENT OMITTED]

7. It Remains Appropriate and Necessary To Regulate EGUs To Address Public Health and Environmental Hazards Associated With Emissions of Hg and Non-Hg HAP From EGUs

[CONTENT OMITTED]

b. U.S. EGU Non-Hg HAP Emissions Continue To Pose a Hazard to Public Health and the Environment

EPA recently conducted 16 case studies of U.S. EGUs for which we had 2007 to 2009 emissions data (based on the 2010 ICR) and that we anticipated would have relatively higher emissions of non-Hg HAP compared to other U.S. EGUs. Of the 16 facilities modeled, 4 facilities, 3 coal and 1 oil facility, have estimated risks of greater than 1 in 1 million for the most exposed individual. Although section 112(n)(1)(A) does not specify what constitutes a hazard to public health for the purposes of the appropriate and necessary finding, CAA section 112(c)(9) is instructive. As explained in section III.A above, for carcinogenic HAP, section 112(c)(9) contains a test for delisting source categories based on lifetime risk of cancer. That test reflects Congress' view as to the level of health effects associated with HAP emissions that Congress thought warranted continued regulation under section 112. Specifically, section 112(c)(9) provides that a source category can be delisted only if no source emits HAP in quantities which may cause a lifetime risk of cancer greater than 1 in 1 million to the most exposed individual. As noted above, the results of the case study risk analysis confirm that sources in the EGU source category emit HAP in quantities that cause a lifetime risk of cancer greater

than 1 in 1 million. Given Congress' determination that categories of sources which emit HAP resulting in a lifetime cancer risk greater than 1 in 1 million should not be removed from the section 112(c) source category list and should continue to be regulated under 112, we believe risks above that level represent a hazard to public health such that it is appropriate to regulate EGUs under section 112.

Although our case studies did not identify significant chronic non-cancer risks from acid gas emissions from the specific EGUs assessed, the Administrator remains concerned about the potential for acid gas emissions to add to already high atmospheric levels of other chronic respiratory toxicants and to environmental loading and degradation due to acidification. EGUs emit over half of the nationwide emissions of HCl and HF, based on 2010 emissions estimates. In addition, given that many sensitive ecosystems across the country are experiencing acidification, it is appropriate to reduce emissions of this magnitude which carry the potential to aggravate acidification. The Administrator concludes that, in addition to the regulation of non-Hg HAP which cause elevated cancer risks, it is appropriate to regulate those HAP which are not known to cause cancer but are known to contribute to chronic non-cancer toxicity and environmental degradation, such as the acid gases.

These findings independently support a determination that it is appropriate to regulate HAP emissions from EGUs.

[CONTENT OMITTED]

IV. Summary of This Proposed NESHAP

[CONTENT OMITTED]

J. Consideration of Whether To Set Standards for HCl and Other Acid Gas HAP Under CAA Section 112(d)(4)

We are proposing to set a conventional MACT standard for HCl and, for the reasons explained elsewhere, are proposing that the HC1 limit also serve as a surrogate for other acid gas HAP. We also considered whether it was appropriate to exercise our discretionary authority to establish health-based emission standards under CAA section 112(d)(4) for HCl and each of the other relevant HAP acid gases: Cl_2, HF, SeO2, and HCN[162] (because if it were regulated under CAA section 112(d)(4), HCl may no longer be the appropriate surrogate for these other HAP).[163] This section sets forth the requirements of CAA section 112(d)(4); our analysis of the information available to us that informed the decision on whether to exercise discretion; questions regarding

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[162] Before considering whether to exercise her discretion under CAA section 112(d)(4) for a particular pollutant, the Administrator must first conclude that a health threshold has been established for the pollutant.

[163] Hydrogen chloride can serve as a surrogate for the other acid gases in a technology-based MACT standard, because the control technology that would be used to control HCl would also reduce the other acid gases. By contrast, HCl would not be an appropriate surrogate for a health-based emission standard that is protective against the potential adverse health effects from the other acid gases, because these gases (*e.g.*, HF) can act on biological organisms in a different manner than HCl, and each of the acid gases affects human health with a different dose-response relationship.

the application of CAA section 112(d)(4); and our explanation of how this case relates to prior decisions EPA has made under CAA section 112(d)(4) with respect to HCl.

As a general matter, CAA section 112(d) requires MACT standards at least as stringent as the MACT floor to be set for all HAP emitted from major sources. However, CAA section 112(d)(4) provides that for HAP with established health thresholds, the Administrator has the discretionary authority to consider such health thresholds when establishing emission standards under CAA section 112(d). This provision is intended to allow EPA to establish emission standards other than conventional MACT standards, in cases where a less stringent emission standard will still ensure that the health threshold will not be exceeded, with an ample margin of safety. In order to exercise this discretion, EPA must first conclude that the HAP at issue has an established health threshold and must then provide for an ample margin of safety when considering the health threshold to set an emission standard.

It is clear the Administrator may exercise her discretionary authority under CAA section 112(d)(4) only with respect to pollutants with a health threshold. Where there is an established threshold, the Administrator interprets CAA section 112(d)(4) to allow her to weigh additional factors, beyond any established health threshold, in making a judgment whether to set a standard for a specific pollutant based on the threshold, or instead follow the traditional path of developing a MACT standard after determining a MACT floor. In deciding whether to exercise her discretion for a threshold pollutant for a given source

category, the Administrator interprets CAA section 112(d)(4) to allow her to take into account factors such as the following: the potential for cumulative adverse health effects due to concurrent exposure to other HAP with similar biological endpoints, from either the same or other source categories, where the concentration of the threshold pollutant emitted from the given source category is below the threshold; the potential impacts on ecosystems of releases of the pollutant; and reductions in criteria pollutant emissions and other co-benefits that would be achieved by a MACT standard. Each of these factors is directly relevant to the health and environmental outcomes at which CAA section 112 is fundamentally aimed. If the Administrator does determine that it is appropriate to set a standard based on a health threshold, she must develop emission standards that will ensure the public will not be exposed to levels of the pertinent HAP in excess of the health threshold, with an ample margin of safety.

EPA has exercised its discretionary authority under CAA section 112(d)(4) in a handful of prior rules setting emissions standards for other major source categories, including the Boiler NESHAP issued in 2004, which was vacated on other grounds by the DC Circuit Court. In the Pulp and Paper NESHAP (63 FR 18765; April 15, 1998), and Lime Manufacturing NESHAP (67 FR 78054; December 20, 2002), EPA invoked CAA section 112(d)(4) for HCl emissions for discrete units within the facility. In those rules, EPA concluded that HCl had an established health threshold (in those cases it was interpreted as the RfC for chronic effects) and HCl was not classified as a human carcinogen. In light of the absence of evi-

dence of carcinogenic risk, the availability of information on non-carcinogenic effects, and the limited potential health risk associated with the discrete units being regulated, EPA concluded that it was appropriate to exercise its discretion under CAA section 112(d)(4) for HCl under the circumstances of those rules. EPA did not set an emission standard based on the health threshold; rather, the exercise of EPA's discretion in those cases in effect exempted HCl from the MACT requirement. In more recent rules, EPA decided not to propose a health-based emission standard for HCl emissions under CAA section 112(d)(4) for Portland Cement facilities (75 FR 54970 (September 9, 2010), and for Industrial, Commercial, and Institutional Boilers, (75 FR 32005; June 4, 2010 proposal(major); the final major source rule was signed on February 21, 2011 but has not yet been published). EPA has never implemented a NESHAP that used CAA section 112(d)(4) with respect to HF, Cl_2, SeO_2, or HCN.[164]

Because any emission standard under CAA section 112(d)(4) must consider the established health threshold level, with an ample margin of safety, in this rulemaking EPA has considered the adverse health effects of the HAP acid gases, beginning with HCl and including HF, Cl_2, SeO_2, and HCN. Research indicates that HCl is associated with chronic respiratory toxicity. In the case of HCl, this means that chronic inhalation of HCl can cause tissue damage in humans. Among other things, it is corrosive to

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[164] EPA has not classified HF, Cl2, SeO2, or HCN with respect to carcinogenicity. However, at this time the Agency is not aware of any data that would suggest any of these HAP are carcinogens.

mucous membranes and can cause damage to eyes, nose, throat, and the upper respiratory tract as well as pulmonary edema, bronchitis, gastritis, and dermatitis. Considering this respiratory toxicity, EPA has established a chronic RfC for the inhalation of HCl of 20 micrograms per cubic meter (µg/m3). An RfC is defined as an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups[165]) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The development of the RfC for HCl reflected data only on its chronic respiratory toxicity. It did not take into account effects associated with acute exposure,[166] and, in this situation, the IRIS health assessment did not evaluate the potential carcinogenicity of HCl (on which there are very limited studies). As a reference value for a single pollutant, the RfC also did not reflect any potential cumulative or synergistic effects of an individual's exposure to multiple HAP or to a combination of HAP and criteria pollutants. As the RfC calculation focused on health effects, it did not take into account the potential environmental impacts of HCl.

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[165] "Sensitive subgroups" may refer to particular life stages, such as children or the elderly, or to those with particular medical conditions, such as asthmatics.

[166] California EPA considered acute toxicity and established a 1-hour reference exposure level (REL) of 2.1 milligrams per cubic meter (mg/m3). An REL is the concentration level at or below which no adverse health effects are anticipated for a specified exposure duration. RELs are designed to protect the most sensitive individuals in the population by the inclusion of margins of safety.

With respect to the potential health effects of HCl, we note the following:

(1) Chronic exposure to concentrations at or below the RfC is not expected to cause chronic respiratory effects;

(2) Little research has been conducted on its carcinogenicity. The one occupational study of which we are aware found no evidence of carcinogenicity;

(3) There is a significant body of scientific literature addressing the health effects of acute exposure to HCl (for a summary, *see* California Office of Health Hazard Assessment, 2008. Acute Toxicity Summary for Hydrogen Chloride, http://www.oehha.ca.gov/air/hot_spots/2008/ AppendixD2_final.pdf #page=112 EPA, 2001). In addition, we note that several researchers have shown associations between acid gases and reduced lung function and asthma in North American children.[167] However, we currently lack information on the peak short-term emissions of HCl from EGUs, which might allow us to determine whether a chronic health-based emission standard for HCl would ensure that acute exposures will not pose any health concerns, and;

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[167] Dockery DW, Cunningham J, Damokosh AI, Neas LM, Spengler JD, Koutrakis P, Ware JH, Raizenne M, Speizer FE. 1996. Health Effects of Acid Aerosols on North American Children: Respiratory Symptoms. Environmental Health Perspectives 104(5):500–504; Raizenne M, Neas LM, Damokosh AI, Dockery DW, Spengler JD, Koutrakis P, Ware JH, Speizer FE. 1996. Health Effects of Acid Aerosols on North American Children: Pulmonary Function. Environmental Health Perspectives 104(5):506–514.

(4) We are aware of no studies explicitly addressing the toxicity of mixtures of HCl with other respiratory irritants. However, many of the other HAP (and criteria pollutants) emitted by EGUs also are respiratory irritants, and in the absence of information on interactions, EPA assumes an additive cumulative effect (Supplementary Guidance for Conducting Health Risk Assessment of Chemical Mixtures. http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=20533). The fact that EGUs can be located in close proximity to a wide variety of industrial facilities makes predicting and assessing all possible mixtures of HCl and other emitted air pollutants difficult, if not impossible.

In addition to potential health impacts, the Administrator also has evaluated the potential for environmental impacts when considering whether to exercise her discretion under CAA section 112(d)(4). When HCl gas encounters water in the atmosphere, it forms an acidic solution of hydrochloric acid. In areas where the deposition of acids derived from emissions of sulfur and NO_X are causing aquatic and/or terrestrial acidification, with accompanying ecological impacts, the deposition of hydrochloric acid could exacerbate these impacts. Recent research[168] has suggested that deposition of airborne HCl has had a greater impact on ecosystem acidification than previously thought, although direct quantification of these impacts remains an uncertain process. We maintain it is appropriate to consider potential adverse environmental effects in addition to adverse health effects

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[168] Evans, CD, Monteith, DT, Fowler, D, Cape, JN, and Brayshaw, S. *Hydrochloric Acid: an Overlooked Driver of Environmental Change*, Env. Sci. Technol., DOI: 10.1021/es10357u.

when setting an emission standard for HCl under CAA section 112(d)(4).

Because the statute requires an ample margin of safety, it would be reasonable to set any CAA section 112(d)(4) emission standard for a pollutant with a health threshold at a level that at least assures that persons exposed to emissions of the pollutant would not experience the adverse health effects on which the threshold is based due to sources in the controlled category or subcategory. In the case of this proposed rulemaking, we have concluded that we do not have sufficient information at this time to establish what the health-based emission standards would be for HCl or the other acid gases from EGUs alone, much less for EGUs and other sources of acid gas HAP located at or near facilities with EGUs.

Finally, we considered the fact that setting conventional MACT standards for HCl as well as PM (as a surrogate for HAP metals) would result in significant reductions in emissions of other pollutants, most notably SO_2, PM, and other non-HAP acid gases (*e.g.*, hydrogen bromide) and would likely also result in additional reductions in emissions of Hg and other HAP metals (*e.g.*, Se). The additional reductions of SO_2 alone attributable to the proposed limit for HCl are estimated to be 2.1 million tons in the third year following promulgation of the proposed HCl standard. These are substantial reductions with substantial public health benefits. Although NESHAP may directly address only HAP, not criteria pollutants, Congress did recognize, in the legislative history to CAA section 112(d)(4), that NESHAP would have the collateral benefit of controlling criteria pollutants as well and viewed this as an important benefit of the

air toxics program.[169] Therefore, even where EPA concludes a HAP has a health threshold, the Agency may consider the collateral benefits of controlling criteria pollutants as a factor in determining whether to exercise its discretion under CAA section 112(d)(4).

Given the limitations of the currently available information (*e.g.*, the HAP mix where EGUs are located, and the cumulative impacts of respiratory irritants from nearby sources), the environmental effects of HCl and the other acid gas HAP, and the significant co-benefits of setting a conventional MACT standard for HCl and the other acid gas HAP, the Administrator is proposing not to exercise her discretion to use CAA section 112(d)(4).

This conclusion is not contrary to EPA's prior decisions noted earlier where we found it appropriate to exercise the discretion to invoke the authority in CAA section 112(d)(4) for HCl, because the circumstances in this case differ from previous considerations. EGUs differ from the other source categories for which EPA has exercised its authority under CAA section 112(d)(4) in ways that affect consideration of any health threshold for HCl. EGUs are much more likely to be significant emitters of acid gas HAP and non-HAP than are other source categories. In fact, they are the largest anthropogenic emitter of HCl and HF in the U.S, emitting roughly half of the estimated nationwide total HCl and HF emissions in 2010. Our case study analyses of the chronic impacts of EGUs did not indicate any significant potential for them to cause any exceedances of the chronic RfC for

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[169] *See* S. Rep. No. 101–228, 101st Cong. 1st sess. At 172.

HCl due to their emissions alone.[170] However, we do not have adequate information on the other acid gas HAP to include them in our analysis, and did not consider their impacts in concert with other emitters of HCl (such as IB units) to develop estimates of cumulative exposures to HCl and other acid gas HAP in the vicinity of EGUs. In addition, EGUs may be located at facilities in heavily populated urban areas where many other sources of HAP exist. These factors make an analysis of the health impact of emissions from these sources on the exposed population significantly more complex than for many other source categories, and, therefore, make it more difficult to establish an ample margin of safety without significantly more information. Absent the information necessary to provide a credible basis for developing alternative health-based emission standards for all acid gases, and for all the other reasons discussed above, EPA is choosing not to exercise its discretion under CAA section 112(d)(4) for these pollutants from EGUs.

[CONTENT OMITTED]

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[170] For those facilities modeled, the hazard index for HCl ranged from 0.05 to 0.005 (see Non-Hg Case Study Chronic Inhalation Risk Assessment for the Utility MACT "Appropriate and Necessary" Analysis in the docket).

APPENDIX H

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 63

[OAR-2002-0056; FRL-7887-7]

RIN 2060—AM96

Revision of December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units and the Removal of Coal- and Oil-Fired Electric Utility Steam Generating Units From the Section 112(c) List

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The EPA is revising the regulatory finding that it issued in December 2000 pursuant to section 112(n)(1)(A) of the Clean Air Act (CAA), and based on that revision, removing coal- and oil-fired electric utility steam generating units ("coal- and oil-fired Utility Units") from the CAA section 112(c) source category list. Section 112(n)(1)(A) of the CAA is the threshold statutory provision underlying today's action. That provision requires EPA to conduct a study to examine the hazards to public health that are reasonably anticipated to occur as the result of hazardous air pollutant (HAP) emissions from Utility Units after imposition of the requirements of the CAA. The provision also provides that EPA shall reg-

ulate Utility Units under section 112, but only if the Administrator determines that such regulation is both "appropriate" and "necessary" considering, among other things, the results of the study. EPA completed the study in 1998 (the Utility Study), and in December 2000 found that it was "appropriate and necessary" to regulate coal- and oil-fired Utility Units under CAA section 112. That December 2000 finding focused primarily on mercury (Hg) emissions from coal-fired Utility Units. In light of the finding, EPA in December 2000 announced its decision to list coal- and oil-fired Utility Units on the section 112(c) list of regulated source categories. In January 2004, EPA proposed revising the December 2000 appropriate and necessary finding and, based on that revision, removing coal- and oil-fired Utility Units from the section 112(c) list.

By this action, we are revising the December 2000 appropriate and necessary finding and concluding that it is neither appropriate nor necessary to regulate coal- and oil-fired Utility Units under section 112. We are taking this action because we now believe that the December 2000 finding lacked foundation and because recent information demonstrates that it is not appropriate or necessary to regulate coal- and oil-fired Utility Units under section 112. Based solely on the revised finding, we are removing coal- and oil-fired Utility Units from the section 112(c) list. The reasons supporting this action are described in detail below. Other actions related to this final rule include the recent promulgation of the final Clean Air Interstate Rule (CAIR) and the final Clean Air Mercury Rule (CAMR).

DATES: *Effective Date:* The effective date of the final rule is March 29, 2005.

ADDRESSES: EPA has established a docket for this action under Docket ID No. OAR-2002-0056. All documents in the docket are listed in the EDOCKET index at *http://www.epa.gov/edocket.* Although listed in the index, some information is not publicly available, *i.e.,* Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically in EDOCKET or in hard copy at the EPA Docket Center (EPA/DC), EPA West Building, Room B102, 1301 Constitution Ave., NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the EPA Docket Center is (202) 566-1742.

FOR FURTHER INFORMATION CONTACT: Ms. Wendy Blake, OGC Attorney, Office of General Counsel, Environmental Protection Agency, (AR-2344), Washington, DC 20460 telephone number: (202) 564-1821; fax number: (202) 564-5603; e-mail address: *blake.wendy@epa.gov.*

Judicial Review. Pursuant to CAA section 307(b), judicial review of this final rule is available only by filing a petition for review in the United States Court of Appeals for the District of Columbia Circuit by May 31, 2005. EPA designates this action a CAA section 307(d) rulemaking. (See CAA section 307(d)(1)(V); 69 FR 4653 (January 30, 2004).) Under

CAA section 307(d)(7)(B), only an objection to the rule that was raised with reasonable specificity during the time period for public comment can be raised during judicial review. Section 307(d)(7)(B) further provides that if the person raising the objection can demonstrate to the Administrator that it was impracticable to raise the objection during the public comment period or if the grounds for the objection arose after the public comment period but within the time period specified for judicial review and if the objection is of central relevance, EPA will convene a proceeding for reconsideration of the rule and provide the same procedural rights as would have been afforded had the information been available at the time the rule was proposed.

I. Statutory Background

In the 1990 Amendments to the CAA, Congress substantially modified CAA section 112, the provision of the CAA addressing HAP. Among other things, section 112 contains a list of "hazardous air pollutants," which are "pollutants which present, or may present, * * * a threat of adverse human health effects * * * or adverse environmental effects whether through ambient concentrations, bioaccumulation, deposition, or otherwise." (See CAA section 112(b)(2).) In the 1990 amendments to the CAA, Congress listed 190 HAP, and authorized EPA to add or remove pollutants from the list.[1] (See CAA Section 112(b)(1)—(b)(3).)

The types of sources addressed under section 112 include: major sources, area sources, and electric utility steam generating units (Utility Units). (See CAA

[1] The current section 112(b) list includes 188 HAP.

112(a)(1), (a)(2), (a)(8).) A "major source" is any stationary source [2] or group of stationary sources at a single location and under common control that emits or has the potential to emit ten tons or more per year of any HAP or 25 tons or more per year of any combination of HAP. (See CAA 112(a)(1).) A stationary source of HAP that is not a "major source" is an "area source." (See CAA 112(a)(2).) Finally, an electric utility steam generating unit is any "fossil fuel fired combustion unit of more than 25 megawatts that serves a generator that produces electricity for sale." (See CAA 112(a)(8).)

There are two important steps under section 112: (1) Determining whether a source category meets the statutory criteria for regulation under section 112; and (2) promulgating emission standards for those source categories regulated under section 112. In terms of the first step, Congress required EPA to publish a list of categories and subcategories of major sources and area sources by November 15, 1991.[3] (See CAA 112(c)(1) & (c)(3).) Congress further directed EPA to revise this initial list periodically, based on, for example, new information. (See 112(c)(1).) EPA is required to list a category of major sources under section 112(c)(1) if at least one station-

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[2] A "stationary source" of hazardous air pollutants is any building, structure, facility or installation that emits or may emit any air pollutant. (See CAA Section 111(a)(3) and 112(a)(3).)

[3] EPA published the initial list on July 16, 1992. See 57 FR 31,576, July 16, 1992. EPA did not include Utility Units on the initial section 112(c) list because Congress required EPA to conduct and consider the results of the study required by section 112(n)(1)(A) before regulating these units and, therefore, listing in 1992 was not authorized by statute.

ary source in the category meets the definition of a major source—*i.e.*, if a certain amount of a HAP (or combination of HAP) is emitted from the source. (See 112(a)(1).) By contrast, EPA is required to list categories or subcategories of area sources only if they meet one of the following statutory criteria: (1) EPA determines that the category of area sources presents a threat of adverse effects to human health or the environment that warrants regulation under CAA section 112; or (2) the category of area sources falls within the purview of CAA section 112(k)(3)(B) (the Urban Area Source Strategy). (See CAA 112(c)(3).)

For those source categories regulated under section 112, the next step concerns the establishment of emission standards. Under section 112(d), EPA must establish emission standards that "require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section" that the Administrator determines is achievable based on technology, taking into account certain factors such as cost, energy requirements, and other impacts. The emission standard for new sources cannot be, however, less stringent than the level of control achieved by the best controlled similar source, and the emission standard for existing sources cannot be less stringent than the average emission limitation achieved by the best performing 12 percent of existing sources in the category, regardless of cost, energy requirements and other impacts. CAA 112(d)(2) and (3). Finally, within eight years after promulgation of section 112(d) emission standards for a listed source category, EPA must promulgate additional standards if such standards are necessary to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect. (See CAA section 112(f).) These ad-

ditional standards under CAA section 112(f) are commonly referred to as "residual risk" standards.

The criteria for listing major and area sources established in section 112(c)(1) and (c)(3) do not apply to Utility Units because Congress treated Utility Units differently from other major and area sources. Indeed, Congress enacted a special provision for Utility Units in section 112(n)(1)(A), which governs whether Utility Units should even be regulated under section 112.[4] Section 112(n)(1)(A) directs EPA to conduct a study to evaluate what "hazards to public health [are] reasonably anticipated to occur" as the result of HAP emissions from Utility Units "after imposition of the requirements of th[e] Act," (emphasis added) and to report the results of such study to Congress by November 15, 1993. Congress also directed EPA to describe in the report to Congress "alternative control strategies for [those] emissions that may warrant regulation under this section." (See CAA section 112(n)(1)(A).) Section 112(n)(1)(A) further provides that EPA shall regulate Utility Units under section 112 if the Administrator determines, considering the results of the study, that such regulation is "appropriate and necessary." Thus, unlike other major and area sources, Congress first required EPA to examine how "imposition of the requirements of th[e] Act" would affect the overall level of utility HAP

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[4] No one would dispute that certain Utility Units would meet the definition of a "major source" based on the quantity of HAP emitted from such units, or that other Utility Units may meet the "area source" criteria for listing under section 112(c)(3), but Congress recognized this fact in 1990 and specifically enacted section 112(n)(1)(A), which establishes an entirely different test for determining whether Utility Units should be regulated under section 112.

emissions, and then determine whether regulation of Utility Units under section 112 is both appropriate and necessary. Section 112(n)(1)(A) therefore sets an important and unique condition precedent for regulating Utility Units under section 112 and provides EPA discretion in determining whether that condition precedent has been met.

II. Regulatory Background

A. EPA's December 20, 2000 Regulatory Finding

On December 20, 2000, EPA issued a finding pursuant to CAA section 112(n)(1)(A) that it was appropriate and necessary to regulate coal- and oil-fired Utility Units under section 112. In making that finding, EPA considered the Utility Study, which was completed and submitted to Congress in February 1998.

In the Utility Study, we divided Utility Units into three subcategories based on fuel type: coal-, oil-, and gas-fired units. We then analyzed HAP emissions from each subcategory. We followed this approach because each subcategory burns a different fuel, which, in turn, leads to different emissions profiles, which can require different emission controls. This approach is also consistent with EPA's historical practice of subcategorizing Utility Units based on fuel type. *(See, e.g.,* 40 CFR 60.44(a).)

Because EPA subcategorized Utility Units for purposes of the Utility Study, EPA, in December 2000, made separate "appropriate and necessary" findings under section 112(n)(1)(A) for gas-fired, coal-fired, and oil-fired Utility Units. In making these findings, EPA considered the Utility Study and certain additional information obtained after completion of the

Utility Study, including the National Academy of Sciences' report concerning the health effects of methylmercury and actual emissions data obtained in response to an information collection request EPA issued to all coal-fired Utility Units in 1999. *See* 65 FR 79826. EPA reasonably relied on this additional information because the information provided a more comprehensive and contemporaneous record concerning Hg emissions from coal-fired units. Nothing in section 112(n)(1)(A) suggests that Congress sought to preclude EPA from considering more current information in making the appropriate and necessary finding.

In the December 2000 finding, EPA determined that it was appropriate and necessary to regulate coal- and oil-fired units, but not gas-fired units.[5] With respect to the latter, EPA found that regulation of HAP emissions from natural gas-fired Utility Units "is not appropriate or necessary because the *impacts due to HAP emissions from such units are negligible based on the results of the study documented in the utility RTC.*" (Emphasis added) *See* 65 FR 79831.

EPA provided three primary reasons in support of its finding that it was "appropriate" to regulate coal- and oil-fired Utility Units under section 112. First, EPA found that it was appropriate to regulate HAP emissions from coal- and oil-fired Utility Units be-

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[5] Although the December 2000 finding addressed three subcategories of Utility Units—coal-, oil-, and gas-fired units, the majority of the finding concerned Hg emissions from coal-fired power plants. 65 FR 79826-29 (explaining that Hg from coal-fired units is the HAP of greatest concern); Utility Study, ES-27 ("mercury from coal-fired utilities is the HAP of greatest potential concern.").

cause Utility Units "are the largest domestic source of Hg emissions." *See* 65 FR 79830. EPA next found that it was appropriate to regulate coal- and oil-fired Utility Units because "mercury in the environment presents significant hazards to public health and the environment."[6] *See* 65 FR 79830. Finally, EPA explained that it was appropriate to regulate HAP emissions from coal- and oil-fired units because it had identified certain control options that, it anticipated, would effectively reduce HAP from such units. In discussing the appropriate finding, EPA also noted that uncertainties remained concerning the extent of the public health impact from HAP emissions from oil-fired units. Thus, EPA's determination that it was "appropriate" to regulate coal- and oil-fired units under section 112 hinged on the health effects associated with Hg emissions from coal-fired Utility Units, the uncertainties associated with the health effects of HAP from oil-fired Utility Units, and EPA's belief that control options would be available to reduce certain utility HAP emissions.[7]

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[6] Section IV below addresses our conclusion that it is not appropriate and necessary to regulate coal- and oil-fired Utility Units under section 112 and explains why we now believe that our December 2000 finding lacked foundation. As explained below, one of the reasons the December 2000 "appropriate" finding for oil-fired Utility Units lacks foundation is because the record that was before the Agency in December 2000 establishes that Hg is a HAP of concern only as emitted from coal-fired units, not oil-fired units. Utility Study ES-5,13,27. EPA therefore should not have relied upon Hg emissions as a basis for finding it was appropriate to regulate oil-fired units under section 112. *(See, e.g.*, Utility Study ES-5, ES-27.)

[7] The "appropriate" finding for oil-fired units stemmed primarily from EPA's concerns over the potential health effects of nickel from such units. As explained in the January 2004 pro-

Once EPA determined that it was "appropriate" to regulate coal- and oil-fired Utility Units under section 112 of the CAA, EPA next concluded that it was also "necessary" to regulate HAP emissions from such units under section 112. Interpreting the term "necessary" in section 112(n)(1)(A), EPA found that it was necessary to regulate HAP from coal- and oil-fired Utility Units "because the implementation of other requirements under the CAA will not adequately address the serious public health and environmental hazards arising from such emissions identified in the Utility RTC." *See* 65 FR 79830.

In light of the positive appropriate and necessary determination, EPA in December 2000 listed coal- and oil-fired Utility Units on the section 112(c) source category list. *See* 65 FR 79831 (our finding that it is appropriate and necessary to regulate coal- and oil-fired Utility Units under section 112 "adds these units to the list of source categories under section 112(c)."). Relying on CAA section 112(e)(4), EPA explained in its December 2000 finding that neither the appropriate and necessary finding under section 112(n)(1)(A), nor the associated listing were subject to judicial review at that time. EPA did not add natu-

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posed rule, the record before the Agency in December 2000 supported a distinction between nickel and the other HAP emitted from oil-fired units. *See* 69 FR 4688. We proposed that this distinction was reasonable based on the relative amount of nickel emitted from oil-fired units and the health effects associated with such emissions. (See also Utility Study at ES-12 (noting higher population concentrations surrounding oil-fired units). At the time of the proposed rule, we recognized, however, the uncertainties in the data underlying our "appropriate" finding for oil-fired units based on nickel emissions, and for that reason solicited information as to whether nickel emissions from oil-fired plants currently pose a hazard to public health.

ral-gas fired units to the section 112(c) list in December 2000 because it did not make a positive appropriate and necessary finding for such units.

B. Litigation Challenging December 2000 Regulatory Finding

Shortly after issuance of the December 2000 Finding, an industry group challenged the December 2000 finding in the United States Court of Appeals for the District of Columbia Circuit (DC Circuit). *UARG v. EPA,* 2001 WL 936363, No. 01-1074 (DC Cir. July 26, 2001). EPA moved to dismiss the lawsuit on the basis of section 112(e)(4), which provides, in pertinent part, that "no action of the Administrator * * * listing a source category or subcategory under subsection (c) of this section *shall be a final agency action subject to judicial review,* except that any such action may be reviewed under such section 7607 of this title when the Administrator issues emission standards for such pollutant or category." (Emphasis added.) *(See* CAA Section 112(e)(4).)

In its motion to dismiss the petition, EPA argued to the DC Circuit, among other things, that the December 2000 listing of coal- and oil-fired Utility Units was inseparable from the appropriate and necessary finding and that the appropriate and necessary finding and listing actions are not final agency actions pursuant to section 112(e)(4). *See also* 65 FR 79826. EPA further noted in its motion to dismiss that both the finding and the listing would be subject to additional notice and comment as part of the section 112(d) rulemaking. *See* EPA's Motion to Dismiss, *UARG v. EPA,* 2001 WL 936363, No. 01-1074S ("Because the decision to add coal and oil fired electric utility steam generating units to the source category

list is not yet final agency action, it will be among the matters subject to further comment in the subsequent [standards] rulemaking."); 65 FR 79831 (noting that issues related to the listing, such as "the exact dimension of the source category," will be subject to additional comment in the emission standard rulemaking process). The DC Circuit dismissed the challenge to the December 2000 finding for lack of jurisdiction based on section 112(e)(4) of the CAA. The December 2000 finding and associated listing are therefore not final agency actions.

C. January 30, 2004 Proposed Rule and March 2004 Supplemental Notice

On January 30, 2004, EPA published in the **Federal Register** a proposed rule entitled "Proposed National Emissions Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units." (*See* 69 FR 4652 (January 30, 2004).) In that rule, EPA proposed three alternative regulatory approaches. First, EPA proposed to retain the December 2000 Finding and associated listing of coal- and oil-fired Utility Units and to issue under section 112(d) maximum achievable control technology-based (MACT) emission standards for both subcategories. Second, EPA alternatively proposed revising the Agency's December 2000 Finding, removing coal and oil-fired Utility Units from the section 112(c) list,[8] and issuing

[8] We did not propose revising the December 2000 finding for gas-fired Utility Units because EPA continues to believe that regulation of such units under section 112 is not appropriate and necessary. We have not received any information that would cause us to change our conclusion in this regard. In fact,

final standards of performance under CAA section 111 for new and existing coal-fired units that emit Hg and new and existing oil-fired units that emit nickel. Finally, as a third alternative, EPA proposed retaining the December 2000 finding, removing coal and oil-fired Utility Units from the section 112(c) list, and regulating Hg emissions from Utility Units under CAA section 112(n)(1)(A).

Shortly thereafter, on March 16, 2004, EPA published in the **Federal Register** a supplemental notice of proposed rulemaking entitled "Supplemental Notice of Proposed National Emission Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units." *See* 69 FR 13298 (March 16, 2004). In that notice, EPA proposed certain additional regulatory text, which largely governed the proposed section 111 standards of performance for Hg, which included a cap-and-trade program. The supplemental notice also proposed state plan approvability criteria and a model cap-and-trade rule for Hg emissions from coal-fired Utility Units. The Agency received thousands of comments on the proposed rule and supplemental notice.[9] Comments relating to the

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the information that we have received since the Utility Study only confirms the conclusion we reached in December 2000. We therefore take no action today with regard to the December 2000 finding for gas-fired Utility Units.

[9] We initially estimated that we had over 680,000 submissions from the public on the proposed rule and the supplemental notice, which came primarily in the form of letters and e-mails. A recent review of the electronic docket reveals that our initial estimate was over-stated. The docket reflects approximately

central issues concerning today's action are addressed in this preamble. The remainder of our responses are contained in the response to comments document which is in the docket.[10]

D. The December 2004 Notice of Data Availability

On December 1, 2004, EPA published in the **Federal Register** a notice of data availability entitled "Proposed National Emission Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources, Electric Utility Steam Generating Units: Notice of Data Availability." *See* 69 FR 69864 (December 1, 2004). EPA issued this notice to seek additional information and input concerning: (1) Certain Hg data and information that the Agency received in response to the proposed rule and supplemental notice, (2) the different forms of Hg that are emitted into the atmosphere from coal-fired Utility Units and how those forms respond to different control technologies; and (3) a revised proposed benefits methodology for assessing the benefits of Hg regulation. The benefits methodology generally involves analyzing Hg emissions from coal-fired Utility Units, conducting deposition modeling based on the identified Hg emissions, and relating that deposition modeling to methylmercury concentrations in fish. EPA

500,000 separate submissions from the public, about 5,000 of which represent unique comments.

[10] The response to comments document relevant to this rule is called: "Response to Significant Public Comments Concerning the Proposed Revision of the December 2000 Appropriate and Necessary Finding and Proposed Removal of Utility Units From the Section 112(c) List."

conducts benefits analyses for rulemakings consistent with the provisions of Executive Order 12866.

III. EPA's Interpretation of CAA Section 112(n)(1)(A)

As explained above, Congress treated Utility Units differently from other major and area sources and provided EPA considerable discretion in evaluating whether to regulate Utility Units under section 112. Section 112(n)(1)(A) provides, in full:

> The Administrator shall perform a study of the *hazards to public health reasonably anticipated to occur as a result of emissions by electric utility steam generating units* of pollutants listed under subsection (b) of this section after imposition of the requirements of this Act. The Administrator shall report the results of this study to the Congress within 3 years after the date of the enactment of the Clean Air Act Amendments of 1990. The Administrator shall develop and describe in the Administrator's report to Congress alternative control strategies for emissions which may warrant regulation under this section. The Administrator shall regulate electric utility steam generating units under this section, if the Administrator finds such regulation is *appropriate and necessary after considering the results* of the study required by this subparagraph. (Emphasis added.).

The italicized terms in the above paragraph are central terms in section 112(n)(1)(A). Before we address our interpretation of these terms, however, we again summarize the requirements of section 112(n)(1)(A). The first step under section 112(n)(1)(A), which is addressed by the first three sentences of section 112(n)(1)(A), concerns the com-

pletion of a study and submission of the results of that study to Congress by November 15, 1993. The study is to examine the hazards to public health from utility HAP emissions that are reasonably anticipated to occur following imposition of the requirements of the CAA and to identify alternative control strategies for those HAP that may warrant regulation under section 112. The second step, which is addressed by the last sentence of section 112(n)(1)(A), requires EPA to determine whether regulation of Utility Units under section 112 is appropriate and necessary considering, among other things, the results of the study. Congress provided no deadline by which this determination must be made.

Section 112(n)(1)(A) itself contains no clear standard to govern EPA's analysis and determination of whether it is "appropriate and necessary" to regulate utilities under section 112. The first sentence of the subparagraph describes the scope of the study EPA was to conduct. The sentence on EPA's "appropriate and necessary" finding then says that the Agency must make that finding after considering the results of the study. But Congress did not supply an actual definition or test for determining whether regulation of utilities under section 112 is "appropriate and necessary." Thus, EPA must supply a reasonable interpretation of those terms to fill the gap. *Chevron USA Inc. v. NRDC*, 467 U.S. 837 (1984).

Congress' direction on the study provides the only guidance in section 112(n)(1)(A) about the substance of EPA's inquiry. Because the statute provides no other explicit guidance, EPA has chosen to extrapolate from Congress' description of the study to adopt a reasonable interpretation of the phrase "appropri-

ate and necessary." The following sections describe how the Agency has used Congress' guidance on the study to formulate different aspects of our interpretation and application of the "appropriate and necessary" test.

A. Hazards to Public Health Reasonably Anticipated To Occur

In section 112(n)(1)(A), Congress directed EPA to perform a study of "hazards to public health" that would likely result from utility HAP emissions, before making any further decisions about regulating utilities under section 112. Unlike other sections of the CAA, section 112(n)(1)(A) focuses only on hazards to public health. It does not require that EPA study other factors, such as environmental effects without any established pathways to human health effects. In contrast, section 112(n)(1)(B) requires a separate EPA study, although not as a precursor to a regulatory determination, of the "health and environmental effects" of "mercury emissions" from a broad range of sources. Also unlike Section 112(n)(1)(A), many of the other requirements of section 112 explicitly require both an assessment of human health effects and, in addition, an assessment of adverse environmental effects. For example, the Administrator is charged with periodically reviewing the list of Hazardous Air Pollutants and adding pollutants that present a threat of either "adverse human health effects" or "adverse environmental effects." CAA Section 112(b)(2). The Administrator examines area sources of HAPs to determine if they present "a threat of adverse effects to human health or the environment." CAA Section 112(c)(3). The Administrator is to prioritize action under section 112(d) after considering "the

known or anticipated adverse effects of such pollutants on public health and environment." CAA Section 112(e)(2)(A). Nor did Congress appear to view the two terms as synonymous. Under section 112(f), the EPA promulgates emission standards at a level "with an ample margin of safety" to "protect public health." CAA Section 112(f)(2)(A). The Administrator may go further and impose more stringent standards to protect against "an adverse environmental effect" only after considering "cost, energy, safety, and other relevant factors." *Id.*

As described above, section 112(n)(1)(A) also provides no clear standard for analyzing public health effects—in contrast to, for example, section 112(f). Under section 112(f), the issue is whether additional regulation is needed to "provide an ample margin of safety to protect public health." Section 112(f) also expressly incorporates EPA's pre-1990 two-part inquiry for evaluating what level of emission reduction is needed to provide an ample margin of safety to protect public health. See CAA section 112(f)(2)(B) (incorporating EPA's two-part ample margin of safety inquiry, set forth at 54 FR 38044 September 14, 1989, which implemented the requirements of section 112 of the 1977 CAA).[11] By contrast, section 112(n)(1)(A)

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[11] Section 112 of the 1977 CAA directed EPA to promulgate emission standards "at the level which in * * * [the Administrator's judgment] provides an ample margin of safety to protect the public health." Congress substantially amended section 112 in 1990 and enacted several new provisions. Congress specifically incorporated the "ample margin of safety to protect public health" requirement into section 112(f), which applies to any source category that is regulated under section 112(d)(2) and (d)(3). Significantly, Congress did not include the "ample margin of safety" language in section 112(n)(1)(A). Instead, Congress

neither includes the "ample margin of safety to protect public health" requirement, nor does it incorporate EPA's pre-1990 ample margin of safety inquiry.

Because of the focus on "public health" in the section 112(n)(1)(A) study requirement, and because as discussed above Congress did not define the scope of the "appropriate and necessary" finding, EPA is reasonably interpreting section 112(n)(1)(A) to base that finding on an assessment of whether utility HAP emissions likely would result in "hazards to public health."

Moreover, EPA reasonably interprets section 112(n)(1)(A) not to require the Agency either to study or to base its "appropriate and necessary" finding on an assessment of environmental effects unrelated to public health.

As described above, Section 112(n)(1)(A) requires only that the Administrator "consider" the results of the public health study before determining whether utility regulation is "appropriate and necessary." This mild direction, when paired with the considerable discretion inherent in any judgment about whether an action is "appropriate and necessary," has led EPA to conclude that the statute permits the agency to consider other relevant factors when determining whether to regulate emissions from utility units under section 112. This is not to say, however, that EPA believes it may ignore the context of section 112(n) in making its determination.

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directed EPA to assess the "hazards to public health reasonably anticipated to occur" from utility HAP emissions after imposition of the requirements of the CAA, and then determine whether Utility unit emissions should be regulated under section 112 of the CAA.

The Supreme Court has recognized that "where Congress includes particular language in one section of a statute but omits it in another section of the same Act," as here, where section 112(n)(1)(A) refers to public health and conspicuously omits any reference to adverse environmental effect, "it is generally presumed that Congress acts intentionally * * * in the disparate inclusion or exclusion." *Russello v. United States,* 464 U.S. 16, 23 (1983). The only direction that Congress explicitly provided to guide our "appropriate and necessary" finding was that we consider the results of a study of only those "hazards to public health" that the agency "reasonably anticipate[s] to occur."

EPA must reconcile the broad discretion to determine what is "appropriate and necessary" with the implicit Congressional decision that information about environmental effects unrelated to human health effects was not needed for that determination. Rather than conclude that EPA is prohibited from considering environmental effects, however, EPA interprets section 112(n)(1)(A) to permit the agency to consider other relevant factors as part of its "appropriate and necessary" determination, as refined further below, but these factors may not independently, or in conjunction with one another, justify regulation under section 112(n) when EPA has concluded that hazards to U.S. public health are not reasonably anticipated to occur. Compare CAA section 112(f)(2)(A) (Administrator may set a more stringent standard than is required to protect health if necessary, considering factors such as cost, to prevent an adverse environmental effect).

In evaluating hazards to public health under section 112(n)(1)(A) we look at various factors, including, for example, the affected population, the characteristics of exposure *(e.g.,* level and duration), the nature of the data, including the uncertainties associated with the data, and the nature and degree of health effects. In terms of assessing health effects, we have numerous tools at our disposal. See Section VI.H (for fuller discussion of factors relevant to assessing the hazards to public health). For example, for cancer effects, we can assess the lifetime excess cancer risk, and for other effects, we look to tools, such as the reference dose.[12] As explained below, the "hazards to public health reasonably anticipated to occur" standard is relevant not only for the Study, but also for the appropriate and necessary determination.

EPA has also taken note of the context for assessing "hazards to public health," for the language of section 112(n)(1)(A), calls for an analysis of the "hazards to public health" reasonably anticipated to "occur as a result of emissions by electric utility steam generating units." (Emphasis added.) Section 110(a)(2)(D) provides an instructive comparison in this regard. In section 110(a)(2)(D), Congress required that each state implementation plan contain adequate provisions "prohibiting * * * any source or other type of emissions activity within the State from emitting any air pollutant in amounts" that will "contribute significantly to nonattainment" of the national ambient air quality standards. This provision demonstrates that Congress knew how to require regulation of emissions of air pollutants even where

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[12] Section VI below discusses the reference dose ("RfD") in detail.

the pollutants themselves do not cause a problem, but rather only "contribute to a problem." Unlike section 110(a)(2)(D), in section 112(n)(1)(A), Congress focused exclusively on the "hazards to public health" of HAP emissions "result[ing] from" Utility Units. Rather, it is the EPA study performed pursuant to section 112(n)(1)(B), not the inquiry under section 112(n)(1)(A), that examines all current anthopogenic sources of Hg emissions and their effects on human health and the environment. EPA has concluded that its inquiry under section 112(n)(1)(A) may reasonably focus solely on whether the utility HAP emissions themselves are posing a hazard to public health. This focus on utility emissions only is consistent with Congress' overall decision to provide for separate treatment of utilities in section 112(n)(1)(A).

B. Imposition of the Requirements of This Act

Congress required EPA to examine the hazards to public health from utility emissions "after imposition of the requirements of this Act." The phrase "imposition of the requirements of th[e] Act" is susceptible to different interpretations because Congress did not specify the scope of the requirements under the CAA to be considered or, more importantly, the time period over which the imposition of requirements was to be examined. EPA reasonably interprets the phrase "imposition of the requirements of th[e] Act" to include not only those requirements already imposed and in effect, but also those requirements that EPA reasonably anticipates will be implemented and will result in reductions of utility HAP emissions. This interpretation is reasonable in view of the fact that Congress called for the study to be completed within three years of enactment of the 1990 CAA Amend-

ments. At such time, EPA could have only forecast, to the extent possible, how implementation of the requirements of the CAA would impact utility HAP emissions, based on the science and the state of technology at the time.[13]

We are interpreting the phrase "requirements of th[e] Act" broadly to include CAA requirements that could either directly or indirectly result in reductions of utility HAP emissions. For example, certain provisions of the CAA that affect Utility Units, such as the requirements of Title I and Title IV, require controls on pollutants like SO_2 or NO_x. Although these pollutants are not HAP, the controls that are required to achieve the needed reductions have the added effect of reducing HAP emissions. Thus, given our interpretation of the phrase "imposition of the requirements of th[e] Act," we read the first sentence of section 112(n)(1)(A) as calling for a study of the hazards to public health from utility HAP emissions that EPA reasonably anticipates would occur after implementation of the CAA requirements that EPA, at the time of the study, should have reasonably anticipated

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[13] Although the December 2000 finding does not provide an interpretation of the phrase "after imposition of the requirements of the[e] Act," the Utility Study, on which that finding was based, does account for the phrase by evaluating utility HAP emission levels in 2010. See Utility Study ES-2 (the "2010 scenario was selected to meet the section 112(n)(1)(A) mandate to evaluate hazards 'after imposition of the requirements of 'the CAA."). We do not believe that the December 2000 finding or the January 2004 proposal properly give effect to all of the terms of section 112(n)(1)(A), including the first sentence of section 112(n)(1)(A). We therefore provide our interpretation of the central terms in that sentence above, as those terms are relevant to the final actions we are taking today.

would be implemented and would directly or indirectly result in reductions of utility HAP emissions.

Finally, it is telling that Congress directed EPA to examine the utility HAP emissions remaining "after imposition of the requirements of th[e] Act," because there is no other provision in section 112 that calls for EPA to examine the requirements of the CAA in assessing whether to regulate a source category under section 112.[14] Congress plainly treated Utility Units differently from other source categories, and that special treatment reveals Congress' recognition that Utility Units are a broad, diverse source category that is subject to numerous CAA requirements, including requirements under both Title I and Title IV, and that such sources should not be subject to duplicative or otherwise inefficient regulation.[15] See 136

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[14] Section 112(m)(6) provides an instructive comparison because it requires EPA to examine the other provisions of section 112, and to determine whether those provisions are adequate to prevent serious adverse effects to public health and the environment associated with atmospheric deposition to certain waterbodies. Section 112(m)(6) also requires EPA to promulgate additional regulations setting emission standards or control requirements, "in accordance with" section 112 and under the authority of section 112(m)(6), if EPA determines that the other provisions of section 112 are adequate, and such regulations are appropriate and necessary to prevent serious adverse public health and environmental effects. Section 112(n)(1)(A) provides EPA far greater discretion because under that section, EPA is not only to evaluate the reasonably anticipated public health hazards remaining "after imposition of the requirements of th[e] Act," but also to determine whether to regulate Utility Units under section 112 of the CAA at all.

[15] As noted elsewhere, section 112(n)(1)(A) was included in the House Committee bill and adopted by the House; while the Senate included a different provision. In the Conference Committee, the House version prevailed. Sen. Durenberger, a Senate

Cong. Rec. H12911, 12934 (daily ed. Oct. 26, 1990) (Statement of Congressman Oxley) (stating that the conferees adopted section 112(n)(1)(A) "because of the logic of basing any decision to regulate on the results of scientific study and because of the emission reductions that will be achieved and the extremely high costs that electric utilities will face under other provisions of the new Clean Air Act amendments.").

C. Appropriate and Necessary After Considering the Results of the Study

Section 112(n)(1)(A) requires EPA to make a determination as to whether regulation of Utility Units under section 112 is "appropriate and necessary." Congress did not define the terms "appropriate" and "necessary," but provided that regulation of Utility Units under section 112 could occur only if EPA determines that such regulation is both "appropriate" and "necessary."

1. Considering the Results of the Study

The appropriate and necessary determination is to be made only after "considering the results of the study" required under section 112(n)(1)(A). We inter-

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conferee and an evident opponent of the provision, alluded to another purpose for the provision, which concerns the fact that "mercury is a global problem." Legislative History of the Clean Air Act Amendments of 1990, at 872 (Oct. 27, 1990) (statement of Sen. Durenberger). Based on Sen. Durenberger's statement, it appears that one of the reasons for the wide deference Congress accorded EPA under section 112(n)(1)(A) was to allow EPA to account for the fact that Hg emissions from U.S. utilities are a very small part of overall Hg emissions, and therefore that EPA should exercise discretion in considering the uncontrollable amount of risk from Hg that would remain regardless of the extent to which U.S. utilities are controlled.

pret the phrase "considering the results of the study" to mean that EPA must consider the results of the study in making its determination, but that EPA is not foreclosed from analyzing other relevant information that becomes available after completion of the study. This interpretation is reasonable because section 112(n)(1)(A) contains no deadline by which EPA must determine whether it is "appropriate and necessary" to regulate Utility Units under section 112.

Moreover, nothing in section 112(n)(1)(A) suggests that EPA is precluded from considering new relevant information obtained after completion of the Utility Study in determining whether regulation of Utility Units under section 112 is appropriate and necessary. Indeed, the term "considering" in section 112(n)(1)(A) is analogous to the terms "based on" or "including," which are neither limiting nor exclusive terms.[16] In a recent case, the DC Circuit rejected an argument advanced by the petitioners that an EPA rule was invalid because the statute required EPA to promulgate the regulation "based on the study," and according to petitioners EPA's rule was not based on a study that met the requirements of the CAA. *Sierra Club v. EPA*, 325 F.3d 374 (DC Cir. 2003). In rejecting petitioners' arguments, the Court held, among other things, that "the statute doesn't say that the rule must be based exclusively on the study." *Sierra Club v. EPA*, 325 F.3d at 377 (emphasis in original); See also *United States v. United Technologies Corp.*, 985 F.2d 1148, 1158 (2d Cir. 1993) ("based upon" does not mean "solely"); *McDaniel v. Chevron Corp.*, 203 F.3d 1099, 1111 (9th Cir. 2000). Consistent with this

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[16] In fact, the term "considering," on its face, is less limiting than the phrase "based on."

reasoning, EPA reasonably interprets the phrase "considering the results of the study," to mean that EPA must consider the study, but that it can consider other relevant information obtained after completion of the study. Congress could not have reasonably intended for EPA to ignore relevant information concerning HAP emissions from Utility Units solely because that information was obtained after completion of the Utility Study.[17]

2. Appropriate and Necessary

The condition precedent for regulating Utility Units under section 112 is whether such regulation is "appropriate" and "necessary." These are two very commonly used terms in the English language, and Congress has not ascribed any particular meaning to these terms in the CAA. The legislative history does not resolve Congress' intent with regard to these terms. We therefore first examine the structure of section 112(n)(1)(A) and then discuss our interpretation of the terms "appropriate" and "necessary."

a. Examining the Structure of Section 112(n)(1)(A). In interpreting the terms "appropriate" and "necessary" in section 112(n)(1)(A), we begin with the structure of section 112(n)(1)(A). As an initial matter, the order of the terms in the phrase "appropriate and necessary" suggests that the first decision EPA must make is whether regulation of Utility

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[17] Consistent with this interpretation, in December 2000, EPA relied not only on the Utility Study, but also on certain information concerning Hg obtained after completion of the study, including actual emissions data from coal-fired plants for calendar year 1999 and a report from the National Academy of Sciences on the health effects of methylmercury. See 65 FR 79825-27.

Units under section 112 is "appropriate." Even if EPA determines that regulation of Utility Units under section 112 is appropriate, it must still determine whether such regulation is also necessary. Were EPA to find, however, that regulation of Utility Units under section 112 met only one prong, then regulating Utility Units under section 112 would not be authorized by the statute.

The structure of section 112(n)(1)(A) also reveals that the appropriate and necessary finding is to be made by reference to the reasonably anticipated public health risks of utility HAP emissions that remain after "imposition of the requirements of th[e] Act." The first sentence of section 112(n)(1)(A) contains an important direction to EPA, which sets the predicate for the entire provision. That first sentence calls for EPA to identify the hazards to public health reasonably anticipated to occur as a result of the utility HAP emissions remaining "after imposition of the requirements of th[e] Act." Stated differently, Congress wanted EPA to identify the utility HAP emissions that would remain "after imposition of the requirements of th[e] Act" and identify the hazards to public health reasonably anticipated to occur as the result of such emissions. As noted above, we interpret the phrase "imposition of the requirements of th[e] Act" to include those CAA requirements that EPA should have reasonably anticipated would be implemented and would result in reductions of utility HAP emissions.[18] Congress' focus on the other requirements of

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[18] The comments of Rep. Oxley, a member of the Conference Committee, about section 112(n)(1)(A) support EPA's interpretation of that provision. Rep. Oxley stated:

the CAA reflects its recognition that Utility Units are subject to numerous CAA provisions and its intent to avoid duplicative and unnecessary regulation. We therefore reasonably conclude that the appropriate and necessary finding is to be made by reference to the reasonably anticipated public health risks from utility HAP emissions that remain "after imposition of the requirements of th[e] Act."

b. EPA's interpretations of the terms "appropriate" and "necessary." (i) Appropriate. In December 2000, EPA found that it was appropriate to regulate coal- and oil-fired Utility Units under section 112. At that time, we did not provide an interpretation of the term "appropriate." Instead, we focused on the following facts and circumstances. We first found that it was "appropriate" to regulate coal- and oil-fired Utility Units under section 112 because "mercury in the environment presents significant hazards to public health." *See* 65 FR 79830. We also determined that it was appropriate to regulate oil-fired Utility Units based on the uncertainties "regarding the extent of the public health impact from HAP emissions from" such units. *See* 65 FR 79830. Finally, we found that it

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Pursuant to section 112(n), the Administrator may regulate fossil fuel fired electric utility steam generating units only if the studies described in section 112(n) clearly establish that emissions of any pollutant, or aggregate of pollutants, from such units cause a significant risk of serious adverse effects on the public health. Thus, if the Administrator regulates any of these units, he may regulate only those units that he determines—after *taking into account compliance with all other provisions of the CAA* and any other federal, state or local regulation and voluntary emission reductions—have been demonstrated to cause a significant threat of adverse effects on public health.

136 Cong. Rec. H12911, 12934 (daily ed. Oct. 26, 1990) (Statement of Rep. Oxley) (emphasis added).

was appropriate to regulate HAP emissions from coal- and oil-fired units under section 112 because we had identified control options that we anticipated would effectively reduce certain HAP emissions. We also indicated that certain control options could "greatly reduc[e] mercury control costs." *See* 65 FR 79830.

In January 2004, we proposed reversing our "appropriate" finding in large part. Specifically, we proposed that it is not "appropriate" to regulate coal-fired units on the basis of non-Hg HAP and oil-fired units on the basis of non-Ni HAP because the record that was before the Agency in December 2000 indicates that emissions of such pollutants do not result in hazards to public health. *See* Section IV.B.

Webster's dictionary defines the term "appropriate" to mean "especially suitable or compatible." Miriam-Webster's Online Dictionary, 10th ed. Determining whether something is "especially suitable or compatible" for a particular situation requires consideration of different factors. In section 112(n)(1)(A), Congress requires EPA to determine whether it is "appropriate" to regulate Utility Units under section 112. In making this determination, we begin as we did in December 2000, by assessing the paramount factor, which is whether the level of utility HAP emissions remaining "after imposition of the requirements of th[e] Act" would result in hazards to public health. We determine whether the remaining utility HAP emissions cause hazards to public health by analyzing available health effects data and assessing, among other things, the uncertainties associated with those data, the weight of the scientific evidence, and the extent and nature of the health effects. See

Section VI. If the remaining HAP emissions from Utility Units do not result in hazards to public health, EPA does not believe that it would be "especially suitable"—i.e., "appropriate"—to regulate such units under section 112. In this situation, there would be no need to consider any additional factors under the "appropriate" inquiry because the threshold fact critical to making a finding that it is appropriate to regulate Utility Units under section 112 would be missing.

Even if the remaining utility HAP emissions cause hazards to public health, it still may not be appropriate to regulate Utility Units under section 112 because there may be other relevant factors particular to the situation that would lead the Agency to conclude that it is not "especially suitable" or "appropriate" to regulate Utility Units under section 112. For example, it might not be appropriate to regulate the utility HAP emissions remaining "after imposition of the requirements of th[e] Act," if the controls mandated under section 112(d) would be ineffective at eliminating or reducing the identified hazards to public health. Similarly, it might not be appropriate to regulate the remaining utility HAP emissions under section 112 if the health benefits expected as the result of such regulation are marginal and the cost of such regulation is significant and therefore substantially outweighs the benefits. These examples illustrate that situation-specific factors, including cost, may affect whether it "is appropriate" to regulate

utility HAP emissions under section 112.[19] (See Section 112(n)(1)(A).)

It cannot be disputed that Congress under section 112(n)(1)(A) entrusted EPA to exercise judgment by

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[19] Nothing precludes EPA from considering costs in assessing whether regulation of Utility Units under section 112 is appropriate in light of all of the facts and circumstances presented. The DC Circuit has indicated that regulatory provisions should be read with a presumption in favor of considering costs: "It is only where there is 'clear congressional intent to preclude consideration of cost' that we find agencies barred from considering costs. [Citations omitted.]" *Michigan v. EPA*, 213 F.3d 663, 678 (DC Cir. 2000), cert. den., 532 U.S. 903 (2001) (upholding EPA's interpretation of "contribute significantly" under CAA section 110(a)(2)(D) to include a cost component). The Supreme Court's decision in *Whitman v. American Trucking Assn's (ATA)*, Inc., 531 U.S. 457 (2001), is not to the contrary. In that case, the Court held that EPA lacked authority to consider costs in the context of setting the national ambient air quality standards under CAA section 109(b)(1), because the "modest words 'adequate margin' and 'requisite'" in that section do not "leave room" to consider cost. 531 U.S. 466. By contrast, EPA is not setting emission standards in today's action, but rather determining, as Congress directed, whether it is "appropriate" and "necessary" to regulate Utility Units under CAA section 112. The terms "appropriate" and "necessary" are broad terms, which by contrast to the terms at issue in ATA do, in fact, leave room for consideration of costs in deciding whether to regulate utilities under section 112. Moreover, the legislative history of section 112(n) indicates that Congress intended for EPA to consider costs. See 136 Cong. Rec. H12911, 12934 (daily ed. Oct. 26, 1990) (statement of Rep. Oxley) ("[T]he conference committee produced a utility air toxics provision that will provide ample protection of the public health while avoiding the imposition of excessive and unnecessary costs on residential, industrial and commercial consumers of electricity."). Finally, section 112(n)(1)(A) requires EPA to consider alternative control strategies, and the focus on such strategies may reasonably be read as further evidence of the relevance of costs. *See, e.g.*, 65 FR 79830 (discussing costs in relation to certain technologies).

evaluating whether regulation of Utility Units under section 112 is, in fact, "appropriate." We believe that in exercising that judgment, we have the discretion to examine all relevant facts and circumstances, including any special circumstances that may lead us to determine that regulation of Utility Units under CAA section 112 is not appropriate.[20]

(ii) Necessary. Like the "appropriate" finding, the "necessary" finding must be made by reference to the utility HAP emissions remaining after imposition of the requirements of the CAA.

Specifically, we interpret the term "necessary" in section 112(n)(1)(A) to mean that it is necessary to regulate Utility Units under section 112 only if there are no other authorities available under the CAA that would, if implemented, effectively address the remaining HAP emissions from Utility Units. Assessing whether an alternative authority would effectively address the remaining utility HAP emissions would involve not only: (a) An analysis of whether the alternative legal authority, if implemented, would address the identified hazards to public health, which was a concept specifically addressed in December 2000 and in the January 2004 proposal, but also (b)

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[20] Significantly, in December 2000, we acknowledged that factors other than the hazards to public health resulting from utility HAP emissions should be examined in determining whether regulation of Utility Units is appropriate under section 112. Indeed, after concluding that the Hg emissions from coal-fired Utility Units caused hazards to public health, we proceeded with the appropriate inquiry and examined whether there were any control technologies that could effectively reduce Hg. We also commented on the costs of achieving such reductions. *See, e.g.*, 65 FR 79828, 79830.

an analysis of whether the alternative legal authority, if implemented, would result in effective regulation, including, for example, its cost-effectiveness and its administrative effectiveness. See *Michigan v. EPA*, 213 F.3d, 663, 678 (addressing consideration of costs).

This interpretation of the term "necessary" differs slightly from the interpretation advanced in December 2000 and January 2004. In December 2000 and January 2004, we interpreted the term "necessary" to mean that it is only necessary to regulate Utility Units under section 112 if there are no other authorities under the CAA that would adequately address utility HAP emissions. Several commenters noted that under this interpretation, EPA could never regulate HAP under section 112 if it identified an alternative viable legal authority. In light of these comments and further review of section 112(n)(1)(A), we refined our interpretation of the term "necessary" as noted above. We agree that if we found an alternative authority under the CAA but we also determined that such authority would not effectively address the remaining HAP emissions, we should be able to address those emissions under section 112. Accordingly, we maintain that it is necessary to regulate Utility Units under section 112 only if there are no other authorities under the CAA that, if implemented, would effectively address the remaining HAP emissions from Utility Units.

Some commenters argued that the "appropriate and necessary" finding is a public health threshold finding, not an investigation into whether another provision of the CAA would address HAP emissions from utilities. This argument is without merit, how-

ever, because it conflates the terms "appropriate" and "necessary" and renders one term mere surplusage. Congress required EPA to determine whether it was both appropriate and necessary to regulate Utility Units under section 112. EPA agrees that it must evaluate the hazards to public health associated with HAP from utilities in terms of assessing whether regulation under section 112 is "appropriate." But Congress meant something different by the term "necessary," and EPA's interpretation of that term is reasonable. Moreover, we believe that the emissions inquiry envisioned under the first sentence of section 112(n)(1)(A) is distinct from the "necessary" inquiry called for by the last sentence of section 112(n)(1)(A), because under the "necessary" inquiry the issue is not whether EPA reasonably anticipated that a particular provision of the CAA will be implemented and will reduce HAP emissions, but rather whether there are any other authorities in the CAA that could be implemented, and if implemented, could effectively address the hazards to public health that result from the remaining HAP emissions.

Other commenters argued that EPA cannot consider other statutory authorities under the "necessary" prong of the "appropriate and necessary" inquiry because those authorities do not provide for regulation of utility HAP according to the provisions of CAA section 112(d) and (f). This argument is also without merit because it again renders mere surplusage the "necessary" prong of the determination. Moreover, as explained above, Congress did not incorporate the requirements of section 112(f) into section 112(n)(1)(A), but instead, as we interpret section 112(n)(1)(A), called on EPA to consider the "hazards to public health reasonably anticipated to occur" from utility

HAP emissions after imposition of the requirements of the CAA, in determining whether it is both appropriate and necessary to regulate Utility Units under section 112.

3. The Timing and Nature of the "Appropriate and Necessary" Determination

Congress set no deadline in section 112(n)(1)(A) by which EPA must determine whether regulation of Utility Units is appropriate and necessary. We believe that Congress provided sufficient discretion under section 112(n)(1)(A)—in terms of both the substance and the timing of the appropriate and necessary finding—that nothing precludes us from revising our appropriate and necessary finding if we determine either that the finding was in error based on information before the Agency at the time of the finding, or that the finding is incorrect given new information concerning utility HAP emissions obtained after issuance of the finding. Both of these situations are present here, as explained in section IV below.

Moreover, EPA reasonably interprets the last sentence of section 112(n)(1)(A) as authorizing EPA to issue separate appropriate and necessary findings for different subcategories of "electric utility steam generating units." EPA typically subcategorizes large source categories such as utilities. This is especially true for Utility Units because the nature of the fuel used in different units *(e.g.,* coal-, oil-, or gas-fired Utility Units), affects the type and amount of HAP emitted from the units, which, in turn, affects the issue of whether hazards to public health may exist

from such emission. [21] Even where section 112(n)(1)(A) read to require EPA to make only one appropriate and necessary finding for all "electric utility steam generating units," EPA's conclusions, as described below, would remain the same.

IV. Revision of the December 2000 Appropriate and Necessary Finding

In Section II above, we summarize the December 2000 appropriate and necessary finding for coal- and oil-fired Utility Units. In this section, we explain why we now believe that the December 2000 finding lacked foundation and therefore was erroneous. We also address below certain new information obtained since the finding that confirms that it is not appropriate and necessary to regulate coal- and oil-fired Utility Units under section 112. Our discussion below is divided into two sections, the first of which concerns the December 2000 finding for coal-fired units, and the second of which addresses the December 2000 finding for oil-fired units.

A. Revision of the December 2000 Appropriate and Necessary Finding for Coal-fired Units

The majority of the December 2000 finding concerned Hg emissions from coal-fired Utility Units. *See, e.g.*, 65 FR 79826 ("mercury * * * is emitted from coal-fired units, and * * * is the HAP of greatest concern to public health from the industry."); 65 FR 79829-30 (conclusions section of December 2000 finding focuses almost exclusively on Hg); Utility Study, ES-27 ("mercury from coal-fired utilities is the HAP

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[21] We received no adverse comments concerning our subcategorization of Utility Units for purposes of section 112(n)(1)(A).

of greatest potential concern."). For that reason, we first address how EPA erred in making the appropriate and necessary finding for coal-fired units based on Hg emissions. We then discuss the December 2000 finding for coal-fired units with regard to non-Hg HAP.

1. It Is Not Appropriate and Necessary To Regulate Coal-Fired Units on the Basis of Hg Emissions

a. It Is Not Appropriate to Regulate Coal-fired Units on the Basis of Hg Emissions. As noted above, EPA's December 2000 "appropriate" finding is framed primarily in terms of health effects resulting from Hg emissions from coal-fired Utility Units.[22] *See* 65 FR 79829. The December 2000 finding also discusses environmental effects, primarily in the context of public health. In particular, the appropriate finding discusses the effects of Hg on fish because the public's primary route of exposure to Hg is through consump-

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[22] The "appropriate" rationale set forth in the December 2000 finding focused exclusively on Hg with regard to coal-fired Utility Units. The December 2000 "necessary" finding can be read, however, to suggest that under the appropriate prong, EPA also determined that non-Hg from coal-fired Utility Units resulted in hazards to public health. See 65 FR 79830 *("It is necessary to regulate HAP emissions from coal- and oil-fired"* Utility Units under section 112 "because the implementation of other requirements of the CAA will not address the serious public health and environmental hazards arising from such emissions."). As explained below in section IV.B, the record that was before the Agency in December 2000 confirms that the non-Hg HAP emissions remaining "after imposition of the requirements of th[e] Act" do not result in hazards to public health. In the proposed rule, EPA solicited comment on this issue. We did not receive any new information concerning non-Hg HAP during the comment period that would cause us to change our position as to these HAP.

tion of fish containing methylmercury. *See* 65 FR 79829-30. *See also* Section VI (discussing health effects of Hg). The December 2000 finding also discusses briefly the effects of methymercury on certain fish-eating wildlife, such as racoons and loons. See 65 FR 79830.

As explained above, EPA interprets section 112(n)(1)(A) as not requiring the Agency to consider environmental effects of utility HAP emissions that are unrelated to public health. Nevertheless, EPA believes it has authority under the "appropriate" inquiry to consider other factors, including non-public health related environmental factors. As explained above, however, given the focus in section 112(n)(1)(A) on hazards to public health, we believe that environmental factors unrelated to public health, although they can be considered in the appropriate inquiry, may not independently or, in conjunction with one another, justify regulation of Utility Units under section 112 when EPA has concluded that hazards to public health are not reasonably anticipated to result from utility HAP emissions.

EPA reasonably addressed non-public health related environmental factors, such as exposure to wildlife, in the December 2000 finding, because we separately concluded that Hg emissions from coal-fired Utility Units pose hazards to public health. As explained below, we believe that our December 2000 appropriate finding lacks foundation, and that conclusion is supported by certain recent information. Specifically, we conclude today that the level of Hg emissions remaining after imposition of the requirements of the Act will not cause hazards to public health, and therefore we need not consider other fac-

tors, such as nonpublic health related environmental effects. We do, of course, discuss the effects of Hg on fish, because the ingestion of fish contaminated with methylmercury is the public's primary route of exposure to Hg. See Section VI (discussing health effects of Hg).[23]

As noted above, EPA's December 2000 appropriate finding for coal-fired units hinged primarily on the health and environmental effects resulting from Hg emissions. *See* 65 FR 79830 ("mercury in the environment presents significant hazards to public health and the environment."). This finding lacks foundation, however, for the reasons described below.

(i) The December 2000 Appropriate Finding Is Overbroad To The Extent It Hinged On Environmental Effects. EPA should not have made its appropriate finding because of "hazards to * * * the environment" resulting from Hg emissions from coal-fired Utility Units. Section 112(n)(1)(A) requires EPA to analyze only the "hazards to public health" resulting

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[23] We note, however, that as part of our overall inquiry into the effects of Hg emissions, we assessed the available information on the environmental effects of Hg emissions, including effects that appear to be unrelated to public health. See 1997 Mercury Report to Congress. While that information, in a very general sense, suggests that environmental effects of Hg emissions (unrelated to public health) may be of some concern and therefore warrant further study, the available information is not specific to the effects of Hg emissions from domestic utilities. See RIA Appendix C. Thus, even if EPA were either required or permitted to give unlimited consideration to these non-health-related environmental effects of utility Hg emissions in making the regulatory determination under section 112(n)(1)(A), we would conclude that there is insufficient causal information to conclusively link utility emissions to deleterious effects (in wildlife) from Hg exposure.

from utility HAP emissions, not the environmental effects caused by such emissions. Under section 112(n)(1)(A), the condition precedent for regulation under section 112 is public health hazards, not environmental effects, which Congress included in other provisions of section 112. *See, e.g.*, 112(c)(3) ("a threat of adverse effect to human health or the environment."). The Supreme Court has recognized that "where Congress includes particular language in one section of a statute but omits it in another section of the same Act, it is generally presumed that Congress acts intentionally * * * in the disparate inclusion or exclusion." *Russello v. United States*, 464 U.S. 16, 23 (1983). Accordingly, EPA erred in its December 2000 "appropriate" finding to the extent that it hinged on the environmental effects of HAP, including Hg.

(ii) The December 2000 Appropriate Finding Lacks Foundation Because EPA Did Not Fully Consider The Hg Reductions That Would Result From "Imposition of the Requirements of th[e] Act." As explained above, EPA interprets section 112(n)(1)(A) as providing that the "appropriate" finding should be made by reference to the level of HAP emissions remaining after "imposition of the requirements of th[e] Act." We reasonably interpret the phrase "imposition of the requirements of th[e] Act" to include those requirements that EPA should have reasonably anticipated would be implemented and would result in reductions of utility HAP emissions.

The December 2000 "appropriate" finding lacks foundation because EPA failed to fully account for the Hg emissions remaining after "imposition of the re-

quirements of th[e] Act." [24] That failure resulted in an overestimate of the remaining utility Hg emissions, which is the level of emissions that we considered in making our December 2000 appropriate finding. Had we properly considered the Hg reductions remaining "after imposition of the requirements of th[e] Act" in December 2000, we might well have (and, as discussed below, now believe should have) reached a different conclusion as to whether it was "appropriate" to regulate coal-fired units on the basis of Hg emissions.

We begin our analysis with a brief background concerning the Utility Study. In an attempt to address the requirement in section 112(n)(1)(A) of evaluating utility emissions "after imposition of the requirements of th[e] Act", the Utility Study estimates utility HAP emissions as of the year 2010. See Utility Study ES-1. In quantifying 2010 utility HAP emissions, our analysis focused almost exclusively on the acid rain provisions of Title IV. Title IV of the CAA establishes a national, annual emissions cap for sulfur dioxide (SO_2) emissions from Utility Units, which is to be implemented in two phases. Phase I commences January 1, 1995, and Phase II on January 1, 2000.

EPA relied in the Utility Study on a 1997 Department of Energy report concerning the effects of the implementation of Title IV of the CAA on utilities. Utility Study 2-31 to 2-33, 2-39. That report provides that 53 percent of Utility Units subject to Phase 1 requirements switched to a lower-sulfur coal, 27 per-

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[24] For ease of reference, we refer to the level of utility Hg emissions remaining "after imposition of the requirements" of the CAA as the "remaining Hg emissions."

cent purchased additional emissions allowances, and 16 percent *(i.e.,* 27 Utility Units) installed flue gas scrubbers to comply with the Phase I requirements.[25] In the 2010 utility HAP emissions analysis, EPA accounted for the 27 Utility Units that installed scrubbers to comply with the phase I requirements. Utility Study 2-31. EPA accounted for these scrubbers in the 2010 analysis because it recognized that scrubbers, which control SO_2, achieve HAP reductions, including Hg.[26] Utility Study at ES-19 & 25, 1-2, 2-32, 3-14 (discussing ability of PM controls (including SO_2 controls) to reduce Hg and other HAP emissions from Utility Units).[27] Significantly, however, EPA did not incorporate into the 2010 utility HAP emissions analysis the Hg reductions that we reasonably should have anticipated achieving through implementation of the requirements of Title I of the CAA. See Utility

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[25] Flue gas scrubbers are a type of control technology used to control SO_2.

[26] EPA did not account in its 2010 analysis for the installation of any scrubbers associated with Phase II of the acid rain program, because it only had industry projections as to which units would install scrubbers and, for various reasons, it did not find those projections reliable. Utility Study 2-31 to 2-33.

[27] In the December 2000 finding, we indicate that recent data show that technologies used to control criteria pollutants, like PM, SO_2, and NO_x are not "effective" in controlling Hg. See 65 FR 79828. This statement is incorrect. It is not only inconsistent with other statements in the December 2000 finding, it is contrary to the record that was before the Agency in December 2000. The record indicates that technologies used to control PM, SO_2, and NO_x do reduce HAP, including Hg. Furthermore, insofar as Hg is concerned, these technologies result in important reductions of oxidized Hg, which is the type of Hg that tends to deposit locally and regionally. Utility Study at ES-19 & 25,1-2,2-32, 3-14.

Study, at 2-31 to 2-33. In this regard, EPA erred in, at least, two respects.

First, EPA erred by not accounting for the utility Hg reductions that it should have reasonably anticipated would result from implementation of the nonattainment provisions of Title I, including, in particular, the revised NAAQS for ozone that EPA issued in July 1997, before the report was completed, under the nonattainment provisions.[28] The Utility Study expressly recognizes that the revised NAAQS would result in, among other things, significant reductions of SO_2 and NO_x. See generally Utility Study at 1-2 to 1-3. The Utility Study also indicates that the revised NAAQS would result in approximately a 16 percent reduction (11 tons per year) of Hg emissions by 2010, primarily due to the fact that Utility Units would need to install controls, like scrubbers, to meet the SO_2 reductions needed to attain the PM NAAQS. (Utility Study 1-3, ES-25, 3-14). Notwithstanding these significant estimated reductions, EPA did not take these reductions into account in its 2010 utility HAP emissions analysis.[29] ES-25 ("analyses per-

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[28] For additional background concerning the nonattainment provisions of Title I and the revised PM and ozone NAAQS, see Section V below.

[29] In the Utility Study, we explained that we did not account for the identified Hg reductions in the 2010 analysis because we lacked information on the specific number of units that would install scrubbers and related PM control technologies since we had not yet designated which areas of the country were in nonattainment of the revised NAAQS. See Utility Study 2-32. Although we had not yet designated areas of the country as being in nonattainment of the revised standards, as explained in section V, we were generally aware of the likelihood of widespread nonattainment with the revised NAAQS. In fact, that recognition formed the basis of our analysis that resulted in an esti-

formed to assess compliance with the revised NAAQS * * * indicate that Hg emissions in 2010 may be reduced by approximately 16 percent (11 tpy) *over those projected in this report.*"). Accordingly, the December 2000 appropriate finding lacks foundation because we made the finding based on an inaccurate level of Hg emissions remaining after imposition of the requirements of the CAA. Had we properly accounted in December 2000 for the 11 tons per year of Hg reductions that we projected in our own analyses, we might well have (and, as discussed below, now believe should have) concluded that it was not appropriate to regulate coal-fired units under section 112 on the basis of the remaining Hg emissions. Indeed, recent modeling confirms that we likely would have reached such a conclusion. That modeling specifically demonstrates that about a 13 ton reduction in utility Hg emissions from 1990 levels would result in a level of Hg emissions that does not cause hazards to public health. We conducted these recent analyses in conjunction with the recently signed Clean Air Interstate Rule ("CAIR") issued pursuant to CAA section 110(a)(2)(D), which is explained more fully in section V below.

Second, EPA erred in December 2000 by not examining, and therefore not accounting for, the reductions in utility Hg emissions that would result from two other rules issued pursuant to Title I of the CAA. The first rule set new source performance standards ("NSPS") under CAA section 111(b) for NO_x emitted from utility and industrial boilers. The second rule, promulgated under CAA section 110(a)(2)(D), re-

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mated 16 percent reduction in Hg emissions from implementation of the revised NAAQS.

quires 22 states and the District of Columbia to revise their state implementation plans ("SIP") to mitigate for the interstate transport of ozone. This rule is called the NO_x SIP-call rule and requires significant reductions of NO_x emissions in the eastern half of the United States. EPA determined those NO_x reductions by analyzing Utility Units and large nonpoint utility sources and identifying the amount of reductions that those units could achieve in a "highly cost-effective" manner. Both the NO_x SIP call and the NSPS rule were premised on a NOx control technology called selective catalytic reduction ("SCR"). The data on the effectiveness of SCR at controlling utility Hg emissions was limited in February 1998. See Utility Study 2-32. As of December 2000, however, EPA had additional data that confirmed that SCR would lead to certain reductions in utility Hg emissions. *See, e.g.*, 65 FR 79829 (SCR—a NO_x control technology "may also oxidize mercury and therefore enhance mercury control."). EPA therefore should have been able to reasonably estimate in December 2000 that some Hg reductions would occur as the result of implementation of the NSPS and the NO_x SIP-call rules. Because we did not account for reductions in utility Hg emissions as the result of implementation of these rules, we made our appropriate finding in December 2000 based on an incorrect estimate of the remaining Hg utility emissions. Based on all of the above, the December 2000 "appropriate" finding lacked foundation because it was not based on the level of utility Hg emissions remaining "after imposition of the requirements of th[e] Act."

(iii) It Is Not Appropriate to Regulate Coal-fired Utility Units Under Section 112 on the Basis of Hg Emissions Because New Information Reveals that the

Level of Utility Hg Emissions Remaining After Imposition of the Requirements of the CAA Does Not Cause Hazards to Public Health. In addition to the errors noted above with regard to the December 2000 finding, we have new information that confirms that it is not appropriate to regulate coal-fired units under section 112 on the basis of Hg emissions. EPA recently signed a rulemaking implementing section 110(a)(2)(D), called the Clean Air Interstate Rule. (See Section V below for further discussion of CAIR.) This rulemaking, among other things, requires a number of eastern states to develop SIPs providing for substantial reductions of SO_2 and NO_x emissions. Although affected states retain flexibility to decide how to achieve those reductions, EPA has concluded that the reductions from Utility Units are highly cost-effective, and anticipates that affected states will meet their emission reduction obligations by controlling Utility Unit emissions. EPA also concluded that the technologies that most cost-effectively achieve SO_2 and NO_x reductions for Utility Units are scrubbers for SO_2 and SCR for NO_x. These technologies, as noted above, result in reductions of utility Hg emissions. In conjunction with the CAIR rulemaking, EPA analyzed the nature of Hg emissions that would remain after implementation of the rule and assumed that states would choose to regulate Utility Units, which is the most cost-effective option for achieving the required reductions. That modeling reveals that the implementation of section 110(a)(2)(D), through CAIR, would result in a level of Hg emissions from Utility Units that would not cause hazards to public health. See Section V for further detail. Because this new information demonstrates that the level of Hg emissions projected to remain "after imposition of"

section 110(a)(2)(D) does not cause hazards to public health, we conclude that it is not appropriate to regulate coal-fired Utility Units under section 112 on the basis of Hg emissions.[30]

In addition to CAIR, we today finalized a rule pursuant to section 111, called the Clean Air Mercury Rule ("CAMR"). (See section VII below for further discussion of CAMR.) That rule requires even greater reductions in Hg emissions from coal-fired Utility Units than CAIR. As explained in greater detail in Section VI, the computer modeling completed in support of that rule, like the modeling completed on CAIR, demonstrates that CAMR, independent of CAIR, will result in levels of utility Hg emissions that do not result in hazards to public health. Thus, the implementation of CAMR provides an independent basis for our conclusion that it is not appropriate to regulate coal-fired Utility Units under section 112 because the utility Hg emissions remaining after implementation of section 111 will be at a level that results in no hazards to public health.[31]

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[30] The reductions achieved through CAIR overlap, in part, with the 11 tons per year of reductions discussed in the prior section, which EPA estimated in 1998 would occur as the result of implementation of the revised NAAQS. The reductions necessarily overlap because in the Utility Study EPA projected forward 13 years, by examining utility HAP emissions in 2010. In analyzing the level of utility Hg emissions remaining "after imposition of [section 110(a)(2)(D)]" through CAIR, we are accounting for the full impact of CAIR and that necessarily includes reductions that occur between today and 2010, and beyond. See Section V (discussing requirements of CAIR in 2010 and 2015).

[31] Nothing in section 112(n)(1)(A) precludes EPA from revising a prior appropriate and necessary finding based on new information. In light of CAIR and, independently, CAMR, we can now reasonably anticipate the reductions in utility Hg emissions

b. It Is Not Necessary to Regulate Coal-fired Units on the Basis of Hg Emissions. Even if Congress had intended EPA to focus on a more limited set of requirements in interpreting the phrase "after imposition of the requirements of th[e] Act," that would mean only that EPA did not err in December 2000 in terms of its "appropriate" finding for coal-fired units based on Hg emissions. EPA nevertheless concludes today that it still erred in December 2000 with regard to its "necessary" finding. In section 112(n)(1)(A), Congress called on EPA to make a finding as to whether regulation of Utility Units under section 112 was not only "appropriate," but "necessary." To give effect to the term "necessary," we interpret the "necessary" prong of the section 112(n)(1)(A) inquiry to require EPA to examine whether there are any other available authorities under the CAA that, if implemented, would effectively address the remaining Hg emissions from coal-fired Utility Units.

In December 2000, EPA did not consider CAA sections 110(a)(2)(D) [32] and 111,[33] which are viable al-

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that would result from implementation of sections 110(a)(2)(D) and 111 of the CAA. Accordingly, we are accounting for those reductions in assessing the level of utility Hg emissions remaining after "imposition of the requirements of th[e] Act," which include section 110(a)(2)(D) and 111. We then based our new appropriate finding on these remaining Hg emissions.

[32] In January 2004, the proposed section 111 rule was premised, in part, on the reductions in Hg emissions that EPA anticipated would be achieved through CAIR. In response to comments received on the CAMR, we conducted additional modeling that confirmed that CAIR alone, once implemented, would result in levels of utility Hg emissions that do not cause hazards to public health. (See Section VI below). Accordingly, we now believe that CAA section 110()(2)(D) constitutes yet another via-

ternative authorities under the CAA, that, if implemented, would effectively address the remaining utility Hg emissions. See Section VI below. Regulation under these authorities would effectively address the remaining utility Hg emissions for two primary reasons. First, as demonstrated in section VI below, the level of utility Hg emissions remaining after implementation of CAIR will not result in hazards to public health. Similarly, as shown in section VI below, the CAMR, which requires even greater Hg reductions than CAIR, will, once implemented, result in a level of utility Hg emissions that does not cause hazards to public health.

In addition, controlling Hg emissions through a cap-and-trade system—whether that control is through direct regulation under section 111 or indirect regulation under section 110(a)(2)(D)—is an efficient means of regulating Utility Units. See CAMR final rule (signed on March 15, 2005) (discussing basis and purpose of the regulations). As an initial mat-

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ble authority under the CAA that, once implemented, will effectively address the remaining utility Hg emissions.

[33] In the Utility Study, we considered section 111 of the CAA, noting that "new source performance standards currently provide the major regulatory authority for the control of air emissions from utilities." Utility Study 1-6. We recognized that we had issued NSPS for PM for Utility Units and we noted that such requirements would result indirectly in the control of certain HAP, including Hg. EPA did not, however, address in the Utility Study the question of whether HAP from utilities could be regulated under the authority of section 111 [Utility Study 1-5-6]. As explained in the proposed rule, we conducted a thorough re-evaluation of the provisions of the CAA and have concluded that section 111 provides authority to regulate HAP from new and existing Utility Units. See Section VII below (discussing legal authority under section 111).

ter, a cap-and-trade system, as opposed to the control regime imposed pursuant to section 112(d), provides Utility Units the flexibility to pursue a least-cost compliance option to achieve the required emissions reductions.

Sources have the choice of complying with the reductions in a variety of ways, such as fuel switching, installing different pollution control technologies, installing new or emerging control technologies and/or buying allowances to emit from another source that has controlled its emissions to a level below what the regulation requires. This compliance flexibility allows Utility Units to respond to changing electricity generation demands, economic market conditions or unanticipated weather situations *(e.g.,* extremely hot or cold periods) without jeopardizing their compliance status, or the stability of the overall cap. In addition, the certainty provided by the emissions cap and the timeline for declining emissions provide important information for industry to make strategic, long-range business decisions.

Moreover, under a cap-and-trade approach, most of the reductions are projected to result from larger units installing controls and selling excess allowances, due to economies of scale realized on the larger units versus the smaller units. Indeed, EPA's modeling of trading programs demonstrates that large coal-fired Utility Units, which tend to have higher levels of Hg emissions, will achieve the most cost-effective emission reductions. These units are more likely to over-control their emissions and sell allowances, than to not control and purchase allowances. This model prediction is consistent with principles of capital investment in the utility industry. Under a trading sys-

tem where the firm's access to capital is limited, where the up-front capital costs of control equipment are significant, and where emission-removal effectiveness (measured in percentage of removal) is unrelated to plant size, from an economics standpoint, the utility company is more likely to allocate pollution-prevention capital to its larger facilities than to the smaller plants (since more allowances will be earned from the larger facilities). Economies of scale of pollution control investment will also favor investment at the larger plants. Further, insofar as large coal-fired Utility Units tend to be newer and/or better maintained than medium-sized and small facilities, it can be expected that companies will favor investments in plants with a longer expected lifetime. These modeled predictions are consistent with the pattern of behavior that EPA has observed over the past decade through implementation of the SO_2 emissions trading program under Title IV of the CAA. Thus, under a cap-and-trade program, Hg reductions result from units that are most cost effective to control, which enables those units that are not considered to have cost effective control alternatives to use other mechanisms for compliance, such as buying allowances. By contrast, regulating pursuant to a control regime like section 112(d) does not result in the cost efficiencies that are attendant a cap-and-trade program. For example, under section 112(d), each facility must meet a specific level of emission control, which can result in increased compliance costs, particularly for the smaller Utility Units given economies of scale.

Finally, trading provides greater incentives for the development and adoption of new technologies, which could lead to a greater level of emissions control. See generally 69 FR 4686-87. An additional benefit of the

cap-and-trade programs under sections 110(a)(2)(D) and 111 is that they dovetail well with each other. In particular, the coordinated regulation of SO_2, NO_x, and Hg through CAIR and CAMR improves the cost effective manner of regulation because the reductions are being achieved simultaneously using in some cases the same technology to control more than one pollutant. In addition, the cap-and-trade programs under sections 110(a)(2)(D) complement other cap-and-trade programs that directly affect Utility Units, such as the NO_x SIP-call final rule and the regulations implementing Title IV, which only further enhances the efficiencies of emission control from such units.

In light of CAA sections 110(a)(2)(D) and 111, we believe that we should not have concluded in December 2000 that it "is necessary" to regulate Utility Units under section 112 and therefore our "necessary" finding was in error. Moreover, even setting aside the error that we made in December 2000, we now recognize the availability of these other statutory provisions and we further conclude today that it is not necessary to regulate coal-fired Utility Units under section 112 on the basis of the remaining Hg emissions. CAA section 110(a)(2)(D), as implemented through CAIR, and independently section 111, as implemented through CAMR, will effectively address the Hg emissions remaining from coal-fired Utility Units "after imposition of the requirements of th[e] Act."

In sections V and VII below, we address sections 110(a)(2)(D) and 111 and provide a thorough discussion of the legal authority under each provision. We also explain in Section VI that after implementation

of CAIR, and independently, CAMR, we do not anticipate hazards to public health resulting from Hg emissions from coal-fired Utility Units.

2. It Is Not Appropriate and Necessary to Regulate Coal-Fired Units on the Basis of Non-Hg Emissions

In the study required by section 112(n)(1)(A), and detailed in the Utility Study, EPA identified 67 HAP as potentially being emitted by Utility Units. (Utility Study, ES-4). Based on a screening assessment designed to prioritize HAP for further evaluation, EPA identified 14 HAP as a priority for further evaluation. (Id.). Of the 14 HAP identified for further evaluation, 12 HAP (arsenic, beryllium, cadmium, chromium, manganese, nickel, hydrogen chloride, hydrogen fluoride, acrolein, dioxins, formaldehyde and radionuclides) were identified for further study based on potential for inhalation exposure and risks. (Utility Study, ES-6). Four of those 12 HAP (arsenic, cadmium, dioxins and radionuclides) plus Hg and lead were considered priority for multipathway exposure. *(Id.)*. Of those six HAP, four (arsenic, Hg, dioxins and radionuclides) were identified as the highest priority to assess for multipathway exposure and risks. (Utility Study, ES-6, 7). The other 53 HAP were not evaluated beyond the screening assessment. (Utility Study, ES-7).

In evaluating the potential for inhalation exposure and risks for the 12 HAP identified through the screening assessment as priority for that purpose, EPA estimated the high-end inhalation cancer risk for each HAP identified as a carcinogen and the high-end inhalation noncancer risks for the remaining HAP for both coal- and oil-fired Utility Units in 2010. (Utility Study, 6-16, tables 6-8 and 6-9). That evalua-

tion indicated that there was no maximum individual risk (MIR) for cancer greater than 1 x 10^{-6} for beryllium, cadmium, dioxin and nickel emissions from coal-fired Utility Units and for beryllium, cadmium and dioxin emissions from oil-fired Utility Units. *(Id.)* With regard to dioxins, the Utility Study specifically concluded that the quantitative exposure and risk results did not conclusively demonstrate the existence of health risks of concern associated with inhalation exposures to utility emissions on a national scale or from any actual individual utility. (Utility Study, 11-5). The Utility Study thus indicates that inhalation of beryllium, cadmium and dioxin emissions from coal and oil-fired Utility Units and emissions of nickel from oil-fired Utility Units are not of significant concern from a public health standpoint because such exposure does not present a maximum individual risk (MIR) for cancer greater than 1 x 10^{-6}. With regard to lead emissions, EPA found that emission quantities and inhalation risks were relatively low and, therefore, decided not to conduct future evaluations of multipathway exposures to lead resulting from Utility Unit emissions. (Utility Study, ES-24). For arsenic, EPA concluded that there were several uncertainties associated with both the cancer risk estimates and the health effects data such that further analyses were needed to characterize the inhalation risks posed by arsenic emissions from Utility Units. (Utility Study, ES-21). The inhalation exposure assessment did not identify any exceedances of the health benchmarks *(e.g.,* RfCs) for hydrogen chloride or hydrogen fluoride, thus indicating that Utility Unit emissions of those HAP did not pose a significant public health concern. (Utility Study chapters 6 and 9.)

a. It Is Not Appropriate to Regulate Coal-fired Units on the Basis of Non-mercury HAP Emissions. The EPA erred in the December 2000 Regulatory Determination to the extent that its "appropriate" finding for coal-fired Utility Units was based, in any way, on hazards to public health or the environment arising from emissions of non-mercury HAP from coal-fired Utility Units. Based on the information before it at the time, EPA could not have reasonably concluded that coal-fired Utility Unit non-mercury HAP emissions presented a hazard to public health. In addition, as stated above, EPA should not have considered environmental effects in the December 2000 Regulatory Determination's consideration of whether it was appropriate to regulate HAP emissions from coal-fired Utility Units under section 112.

(i) Non-Mercury Metallic HAP. In the December 2000 Regulatory Determination, EPA indicated that there were a few metallic HAP *(e.g.*, chromium and cadmium) which were of potential concern for carcinogenic effects, but stated that "the results of the risk assessment (performed in conjunction with the Utility Study) indicate that cancer risks are not high". *(See* 65 FR 79825, 79827.) The EPA acknowledged, however, that the cancer risks were not low enough to eliminate those metals as a potential concern for public health *(Id.)*. This latter statement, at least as it pertains to cadmium, is at odds with the results of the risk assessment set forth in the Utility Study and discussed above. In the Utility Study, EPA determined that there was no maximum individual risk (MIR) for cancer greater than 1×10^{-6} due to inhalation of cadmium emissions from Utility Units. In the Proposed Rule, EPA stated that although it recognized the existence of uncertainties with regard to

the data and information obtained prior to the December 2000 Regulatory Determination regarding potential hazards to public health resulting from Utility Unit emissions of non-mercury metallic HAP, the Agency believed that the uncertainties associated with those emissions were so great that it was not appropriate to regulate them at that time because they do not pose a hazard to public health that warrants regulation. (69 FR 4652, 4688, January 30, 2004). The EPA continues to believe that had it properly accounted for the uncertainties regarding the data and information on potential hazards to public health resulting from Utility Unit emissions of non-mercury metallic HAP in making the December 2000 appropriate finding it would have concluded that it was not appropriate to regulate such emissions because they do not cause a hazard to public health. The EPA has not discovered any new information on hazards to public health arising from such emissions that invalidates this conclusion, either through its own efforts or in response to the Proposed Rule.

(ii) Dioxins. In the December 2000 Regulatory Determination, EPA also identified dioxins as being of potential concern and indicated that they may be evaluated further during the regulatory development process. *(See* 65 FR 79825, 79827.) The EPA did not, however, indicate that those concerns rose to a level that warranted regulation of dioxins. Thus, EPA did not conclude, and could not have concluded, based on the record before it at the time of the December 2000 Regulatory Determination that it was appropriate to regulate coal-fired Utility Unit HAP emissions under section 112 of the CAA on the basis of dioxin emissions. In the Proposed Rule EPA stated that while it

intended to continue to study dioxins in the future, the Utility Study and the information EPA had obtained since finalizing the Utility Study revealed no public health hazards reasonably anticipated to occur as a result of emissions of dioxins by Utility Units. *(See* 69 FR 4652, 4688). As is the case with non-mercury metallic HAP, EPA has neither discovered information on hazards to public health arising from Utility Unit emissions of dioxins based on its own efforts, nor received such information in response to the Proposed Rule. The EPA therefore concludes that its appropriate finding in December 2000 lacked foundation because it could not have reasonably concluded that the level of remaining utility dioxin emissions results in hazards to public health.

(iii) Acid Gases. In the December 2000 Regulatory Determination, EPA identified emissions of hydrogen chloride and hydrogen fluoride as being of potential concern and indicated that such emissions may be evaluated further during the regulatory development process. (See 65 FR 79825, 79827.) The EPA did not, however, indicate that it believed that it was appropriate to regulate such emissions, under section 112 or otherwise. As indicated in the Proposed Rule, EPA did in fact further evaluate Utility Unit emissions of hydrogen chloride and hydrogen fluoride. (See 69 FR 4652, 4688, fn. 10; "Modeling results for hydrogen chloride, hydrogen fluoride and chlorine emissions from coal-fired utility boilers", December 12,2003, OAR-2002-0056-0015). That modeling indicates that individuals are not exposed to acid gas emissions from Utility Units at concentrations which pose hazards to public health. EPA has neither discovered information on hazards to public health arising from Utility Unit emissions of acid gases based on its own

efforts, nor received such information in response to the Proposed Rule. EPA therefore concludes that its appropriate finding in December 2000 lacked foundation because the level of remaining utility acid gas emissions does not result in hazards to public health.

For the reasons stated above, EPA finds that it could not reasonably have concluded that it was appropriate to regulate coal-fired Utility Units under section 112 due to emissions of non-mercury HAP based on the record before it at the time of the December 2000 Regulatory Determination. The EPA further finds that it has not itself discovered any information which would support the conclusion that it is appropriate to regulate non-mercury HAP emissions by coal-fired Utility Units under section 112 subsequent to the December 2000 Regulatory Determination, nor has it received any such information in response to the January 2004 Proposed Rule, the March 2004 Supplemental Notice or the December 2004 Notice of Data Availability. Further, EPA has concluded that it did not, and should not, rely on potential environmental effects alone in determining whether it was appropriate to regulate coal-fired Utility Units under section 112. The EPA, therefore, finds that, based on the record before it at the time, it was in error in determining that it was appropriate to regulate coal-fired Utility Unit HAP emissions under section 112 to the extent that the determination was based in any way on the hazards to public health of non-mercury HAP emissions or on environmental effects resulting from such emissions.

b. It Is Not Necessary to Regulate Coal-fired Units on the Basis of Non-Mercury HAP Emissions. In determining whether it is appropriate and necessary to

regulate Utility Unit HAP emissions under section 112, the threshold question is whether it is appropriate to regulate such emissions at all. Where, as here, EPA cannot reasonably conclude that it is appropriate to regulate such emissions, the Agency does not need to resolve the question of whether it is necessary to regulate such emissions under section 112, or elsewhere. In any event, even if EPA could have reasonably concluded that it was appropriate to regulate non-mercury HAP emissions from coal-fired Utility Units, it would not have been reasonable for the Agency to find that it was necessary to regulate such emissions under section 112 since, as discussed above, it should have realized that there was an available alternative mechanism, such as section 111, for regulating such emissions had it been appropriate to do so. See also Section VII below.

B. Revision of the December 2000 Appropriate and Necessary Finding for Oil-fired Units

1. It Is Not Appropriate and Necessary To Regulate Oil-Fired Units on the Basis of Nickel Emission

a. It Is Not Appropriate to Regulate Oil-fired Units on the Basis of Nickel Emissions. In finding that the regulation of HAP emissions from oil-fired Utility Units was appropriate and necessary in its December 2000 Regulatory Determination, EPA did not clearly identify the basis for this finding beyond stating that there remained uncertainties regarding the extent of the public health impact from HAP emissions from oil-fired units and that those uncertainties led the Administrator to find that regulation of HAP emission from such units under section 112 is appropriate and necessary. (See 65 FR 79825, 79830).

Table 1 in the 2000 determination does, however, indicate that nickel is the metallic HAP emitted in the largest quantities by oil-fired Utility Units and that some nickel compounds are carcinogenic. (See 65 FR 79825, 79828). It therefore appears that EPA's finding was based at least in part on its concerns regarding perceived hazards to public health arising from inhalation exposure to nickel emissions from oil-fired Utility Units. This is consistent with the Utility Study which, based on very conservative assumptions regarding the carcinogenicity of the nickel emitted by such units, identifies nickel as the HAP emitted by oil-fired Utility Units which poses the highest cancer maximum individual risk. (Utility Study, Table 6-3, p. 6-8). The Utility Study identifies 11 oil-fired utility plants as having emissions causing maximum individual risk of cancer greater than 10^{-6} based on nickel emissions *(Id.)*

In the Proposed Rule, EPA stated that it continued to believe that the record supports a distinction between the treatment of nickel emissions from oil-fired Utility Units and other non-nickel HAP emissions from such units. EPA proposed to conclude that it was not appropriate to regulate the non-Ni HAP. EPA also proposed to treat nickel from oil-fired units differently based on the amount of nickel emitted annually and the scope of adverse health effects (See 69 FR 4652, 4688). Based on its analysis of new information obtained in response to the Proposed Rule, EPA has determined that the distinction between nickel and the remaining HAP from oil-fired units cannot be supported. EPA finds that it is not appropriate to regulate nickel emissions from oil-fired Utility Units and that it is, therefore, not appropriate to

regulate oil-fired Utility Units. This finding is based on the following: (1) The significant reductions in the total nationwide inventory of oil-fired Utility Units; and (2) the changing fuel mixtures being used at the remaining units.

Nickel emissions from oil-fired Utility Units have been substantially reduced since the 1998 Utility Report to Congress through a combination of unit closures and fuel switching. The 11 oil-fired plants identified in the Utility Study as having emissions causing a maximum individual risk of cancer greater than 10^{-6} based on nickel emissions were comprised of 42 individual units. Of those 42 units, 12 units have permanently ceased operation or are out of service. (OAR-2002-0056-2046 at pp. 12-13; OAR-2002-0056-5998). In addition, 6 of the original 42 units have reported to the U.S. Department of Energy (DOE) that their fuel mix now includes natural gas. Earlier reports did not show these units as using natural gas as a fuel. (OAR-2002-0056-5998). The use of natural gas as a part of their fuel mix would decrease the nickel emissions from these 6 units. Similarly, another 5 units report using a mix of natural gas and distillate oil (rather than residual oil) in 2003. (OAR-2002-0056-5998). Since distillate oil contains less nickel than the residual oil previously burned by these units, it is reasonable to assume that these units currently emit less nickel than was previously the case. Another 2 units now fire a residual oil/natural gas mixture and have limited their residual oil use through permit restrictions to no greater than 10 percent of the fuel consumption between April 1 and November 15, with natural gas being used for at least 90 percent of total fuel consumption. (OAR-2002-0056-2046 at p. 13). Finally, five units

have effectively eliminated their nickel emissions since the Utility Study by switching to burning natural gas exclusively. (OAR-2002-0056-2046 at pp. 12-13; OAR-2002-0056-5998). Taken as a whole, these changes mean that 30 of the original 42 units identified in the Utility Study have taken steps to reduce or actually eliminate their nickel emissions. Of the original 11 plants identified in the Utility Study, only 2, both in Hawaii, have units for which actions that will result in reduced nickel emissions do not appear to have been taken. (OAR-2002-0056-6871) In addition to the closure of the 12 units identified as being of potential concern in the Utility Study, there has been a steady decrease in the number of oil-fired Utility Units generally over the past decade and this trend is likely to continue. In fact, the latest DOE/EIA projections (OAR-2002-0056-5999) estimate no new utility oil-fired generating capacity and decreasing existing oil-fired generating capacity through 2025, with an additional 29.2 gigawatts of combined oil- and natural gas-fired existing capacity being retired by 2025.

Based on the foregoing, EPA concludes that it is not appropriate to regulate oil-fired Utility Units under section 112 because we do not anticipate that the remaining level of utility nickel emissions will result in hazards to public health.

b. It Is Not Necessary to Regulate Oil-fired Units on the Basis of Nickel Emissions. Because EPA could not have reasonably found that it was appropriate to regulate nickel emissions from oil-fired Utility Units based on the record before it at the time of the December 2000 Regulatory Determination, it should not have made a finding that it was necessary to regulate such emissions. Information obtained in the course of

the rulemaking since the Proposed Rule has confirmed this conclusion. In any event, even if EPA could have reasonably concluded that it was appropriate to regulate nickel emissions from oil-fired Utility Units, it would not have been reasonable for the Agency to find that it was necessary to regulate such emissions under section 112 since, as discussed above, it should have realized that there was an available alternative mechanism, section 111, for regulating such emissions had it been appropriate to do so. See also Section VII below.

2. It Is Not Appropriate and Necessary To Regulate Oil-Fired Units on the Basis of Non-Nickel HAP Emissions

a. It Is Not Appropriate to Regulate Oil-fired Units on the Basis of Non-nickel HAP Emissions. As is the case with emissions of nickel, the record before EPA at the time of the December 2000 Regulatory Determination does not reasonably support a finding that it is appropriate to regulate emissions of any other HAP from oil-fired Utility Units. In the December 2000 Regulatory Determination, EPA stated that there remain uncertainties regarding the extent of the public health impact from HAP emissions from oil-fired Utility Units and, on that basis, found that it was appropriate and necessary to regulate oil-fired Utility Units under section 112. (See 65 FR 79825, 79830.) The EPA neither identified the HAP concerning which there were uncertainties nor identified what those uncertainties were. EPA has neither discovered information on hazards to public health arising from the remaining non-nickel emissions of oil-fired Utility Units, nor received such information in response to the Proposed Rule. EPA therefore con-

cludes that its appropriate finding in December 2000 lacked foundation because, given the level of remaining non-nickel HAP emissions from Utility Units, the Agency did not and does not have any information on the hazards to public health reasonably anticipated to occur. Indeed, the uncertainties that exist with regard to the data and information on these emissions are so great that the Agency has not identified any hazards to public health.

b. It Is Not Necessary to Regulate Oil-fired Units on the Basis of Non-nickel HAP Emissions. Because EPA finds that it is not appropriate to regulate oil-fired Utility Units on the basis of non-nickel HAP emissions, it also finds that it is not necessary to regulate oil-fired Utility Units on the basis of such emissions. In any event, even if EPA could have reasonably concluded that it was appropriate to regulate non-nickel HAP emissions from oil-fired Utility Units, it would not have been reasonable for the Agency to find that it was necessary to regulate such emissions under section 112 since, as discussed above, it should have realized that there was an available alternative mechanism, section 111, for regulating such emissions had it been appropriate to do so. See also Section VII below.

[CONTENT OMITTED]

APPENDIX I

ENVIRONMENTAL PROTECTION AGENCY

[AD-FRL-6919-6]

2060-ZA10

Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of regulatory finding.

SUMMARY: This notice presents EPA's finding required by section 112(n)(1)(A) of the Clean Air Act (CAA) as to whether regulation of emissions of hazardous air pollutants (HAP) from fossil fuel-fired electric utility steam generating units (as defined in section 112(a)(8) of the CAA) is appropriate and necessary. This finding is based on the results of EPA's February 1998 "Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units—Final Report to Congress' (utility RTC), and on information obtained subsequent to the utility RTC concerning HAP emissions to the atmosphere from electric utility steam generating units. In the utility RTC, the EPA indicated that coal- and oil-fired electric utility steam generating units are significant emitters of HAP, including mercury which is emitted from coal-fired units, and which EPA identified as the HAP of greatest concern to public health from the industry. Based on the available information, the Administrator finds that regulation of HAP emissions from coal- and oil-fired electric utility steam generating units under section

112 of the CAA is appropriate and necessary. As a result, this notice adds coal- and oil-fired electric utility steam generating units to the list of source categories under section 112(c) of the CAA. Also in the utility RTC, the EPA indicated that the impacts due to HAP emissions from natural gas-fired electric utility steam generating units were negligible based on the results of the study. The Administrator finds that regulation of HAP emissions from natural gas-fired electric utility steam generating units is not appropriate or necessary. The EPA does not believe that the definition of electric utility steam generating unit found in section 112(a)(8) of the CAA encompasses stationary combustion turbines. Therefore, the finding concerning natural-gas fired electric utility steam generating units does not apply to stationary combustion turbines.

ADDRESSES: Docket No. A-92-55, containing information used in development of this notice, is available for public inspection and copying between 8:00 a.m. and 5:30 p.m., Monday through Friday, excluding legal holidays. The docket is located in EPA's Air and Radiation Docket and Information Center, Waterside Mall, Room M-1500, 401 M Street, SW, Washington, DC 20460, or by calling (202) 260-7548. A reasonable fee may be charged for copying docket materials.

FOR FURTHER INFORMATION CONTACT: Mr. William Maxwell, Emission Standards Division (MD-13), U.S. EPA, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5430, facsimile number (919) 541-5450, electronic mail address <maxwell.bill@epa.gov>.

SUPPLEMENTARY INFORMATION: *Docket.* The docket is an organized file of all the information submitted to or otherwise relied upon by EPA in the development of this regulatory finding. The principal purpose of the docket is to allow interested parties to identify and locate documents that serve as a record of the process engaged in by EPA which resulted in the publication of today's finding.

World Wide Web. In addition to being available in the docket, an electronic copy of today's notice will be posted on the Technology Transfer Network's (TTN) policy and guidance information page *<http://www.epa.gov/ttn/oarpg>* under "Recent Actions." The TTN provides information and technology exchange in various areas of air pollution control. If more information regarding the TTN is needed, call the TTN HELP line at (919) 541-5384.

I. What Is the Statutory Authority and Background of This Finding?

Today's finding is issued under the authority of section 112(n)(1)(A) and 112(c) of the CAA. Section 112(n)(1)(A) requires that, after considering the results of the study mandated by the same section and reported in the utility RTC, the Administrator determine whether regulation of HAP emissions from electric utility steam generating units is appropriate and necessary. The study was initiated following enactment of the 1990 Amendments to the CAA, which included section 112(n)(1)(A). Data were gathered, and the utility RTC was prepared. Section 112(c) provides that the Administrator shall list categories of sources of the air pollutants contained in the section 112(b) list. The listing of source

categories under section 112(c) is a dynamic process. (See "Initial List of Categories of sources under Section 112(c)(1) of the Clean Air Act Amendments of 1990," 57 FR 31576.) Decisions as to the description and scope of source categories listed will be perfected during the course of the rulemaking process for each listed category and will take account of improvements in available information and analysis during the rulemaking. A draft utility RTC was submitted for scientific peer review in July 1995, and, concurrently, was made available for public review (60 FR 35393). A public meeting to obtain comments from the scientific peer review panel was held on July 11-12, 1995 in Research Triangle Park, North Carolina. In addition, a public outreach meeting was held on July 13, 1995 in Durham, North Carolina, at which time the public was invited to present oral comments on its interpretation of the "results of the study." The utility RTC was finalized in February 1998 and released to Congress and the public. In the final utility RTC, the EPA stated that, for the utility industry, mercury from coal-fired electric utility steam generating units was the HAP of greatest concern for public health.

To further inform the regulatory finding, the EPA issued an information collection request under the authority of section 114 of the CAA to all coal-fired electric utility steam generating units requesting coal data from such units for calendar year 1999. Certain units were also required to conduct stack tests to evaluate their HAP emissions. In addition, the EPA solicited data from the public through a February 29, 2000 notice (65 FR 10783). Another public meeting was held on June 13, 2000 in Chicago, Illinois, where the public was invited to provide EPA with their

views on what the regulatory finding should be (65 FR 18992).

Further, the EPA undertook an evaluation of the mercury control performance of various emission control technologies that are either currently in use on electric utility steam generating units for pollutants other than mercury or that could be applied to such units for mercury control. The evaluation was conducted along with other parties, including the Department of Energy (DOE).

In addition, at the direction of Congress, the EPA funded the National Academy of Sciences (NAS) to perform an independent evaluation of the available data related to the health impacts of methylmercury and provide recommendations for EPA's reference dose (RfD—the amount of a chemical which, when ingested daily over a lifetime, is anticipated to be without adverse health effects to humans, including sensitive subpopulations). The NAS conducted an 18-month study of the available data on the health effects of methylmercury and provided EPA a report of its findings in July 2000.

II. What Has EPA Learned From the Utility RTC and the Subsequent Data-Gathering Activities?

The following four sections present a summary of the information and conclusions presented in the utility RTC along with the information obtained subsequent to publishing the utility RTC.

A. *Health Hazard Assessment*

The EPA evaluated exposures, hazards, and risks due to HAP emissions from coal-, oil-, and natural

gas-fired electric utility steam generating units. Much of the assessment focused on inhalation exposure. However, multipathway exposures (*e.g.*, inhalation plus ingestion) were considered for six HAP (mercury, radionuclides, arsenic, cadmium, lead, and dioxins). The assessment for radionuclides was relatively extensive and included multipathway modeling for all facilities identified in the utility RTC. The analysis for mercury was primarily based on information obtained from EPA's December 1997 "Mercury Study Report to Congress" (mercury RTC) and included a multipathway modeling assessment of mercury from four model electric utility plants. Screening level multipathway exposure modeling analyses were also conducted for arsenic and dioxins. For the other two HAP (cadmium and lead), a qualitative assessment of potential concerns for multipathway exposure was presented; multipathway modeling was not conducted for those two HAP. The methods and results of the analyses are presented in the utility RTC.

Based on the assessment of hazards and risks due to emissions of HAP from electric utility steam generating units, mercury is the HAP of greatest concern. Mercury is highly toxic, persistent, and bioaccumulates in food chains. Mercury emitted from electric utility steam generating units (and other sources), primarily in the elemental or divalent forms, is transported through the atmosphere and eventually deposits onto land or water bodies (with the divalent form depositing nearer the source than the elemental form). Once deposited, the chemical form of mercury can change (through a methylation process) into methylmercury which is a highly toxic, more bioavailable, form that biomagnifies in the

aquatic food chain (*e.g.*, fish). Nearly all the mercury that accumulates in fish is methylmercury. Fish consumption dominates the pathway for human and wildlife exposure to mercury. As of July 2000, 40 States and American Samoa have issued fish advisories for mercury. Thirteen of those States have issued advisories for all water bodies in their State, and the other 27 States have issued advisories for over 1,900 specific water bodies.

Because the developing fetus is the most sensitive to the effects of methylmercury, the greatest concern is the consumption of mercury contaminated fish by women of childbearing age. Also of particular concern are subsistence fish-eating populations that may be consuming fish from contaminated waterbodies. The EPA estimates that about 7 percent of women of childbearing age (*i.e.*, between the ages of 15 and 44 years) are exposed to methylmercury at levels exceeding its RfD of 0.1 microgram per kilogram body weight per day (0.1 ug/kg/day). The risk following exposures above the RfD is uncertain, but risk increases with increasing exposure. About 1 percent of women have methylmercury exposures 3 to 4 times the methylmercury RfD. The NAS, in its July 2000 report "Toxicological Effects of Methylmercury," affirmed EPA's assessment of methylmercury toxicity and the level of its RfD.

Most of the mercury currently entering U.S. water bodies and contaminating fish is the result of air emissions which, following atmospheric transport, deposit onto watersheds or directly to water bodies. Wastewater discharges also contribute to environmental loadings, but to a much lesser degree

than air emissions. Based on modeling conducted for the mercury RTC, the EPA estimates that roughly 60 percent of the total mercury deposited in the U.S. comes from U.S. anthropogenic air emission sources; the percentage is estimated to be even higher in certain regions (*e.g.*, northeast U.S.). The remainder of the mercury deposited from the air comes from natural emission sources, reemissions of historic global anthropogenic mercury releases, and from anthropogenic sources outside the U.S. In the mercury RTC, the EPA concluded that, given the total mass of mercury estimated to be emitted from all anthropogenic sources and EPA's modeling of the atmospheric transport of emitted mercury, coal combustion and waste incineration most likely bear the greatest responsibility for direct anthropogenic mercury deposition to the continental U.S. Mercury emissions from waste incineration (including municipal waste combustors and hospital/medical/ infectious waste incinerators) have been declining substantially over the last decade largely due to regulations issued by EPA. Electric utility steam generating units (which are not currently regulated for mercury emissions) are the largest source of mercury emissions in the U.S., estimated to emit about 30 percent of current U.S. anthropogenic emissions. There is a plausible link between emissions of mercury from anthropogenic sources (including coal-fired electric utility steam generating units) and methylmercury in fish. Therefore, mercury emissions from electric utility steam generating units are considered a threat to public health and the environment. It is acknowledged that there are uncertainties regarding the extent of the risks due to electric utility mercury emissions. For

example, there is no quantification of how much of the methylmercury in fish consumed by the U.S. population is due to electric utility emissions relative to other mercury sources (*e.g.*, natural and other anthropogenic sources). Nonetheless, the available information indicates that mercury emissions from electric utility steam generating units comprise a substantial portion of the environmental loadings and are a threat to public health and the environment. The EPA believes that it is not necessary to quantify the amount of mercury in fish due to electric utility steam generating unit emissions relative to other sources for the purposes of this finding.

With regard to the other HAP, arsenic and a few other metals (*e.g.*, chromium, nickel, cadmium) are of potential concern for carcinogenic effects. Although the results of the risk assessment indicate that cancer risks are not high, they are not low enough to eliminate those metals as a potential concern for public health. Dioxins, hydrogen chloride, and hydrogen fluoride are three additional HAP that are of potential concern and may be evaluated further during the regulatory development process.

The other HAP studied in the risk assessment do not appear to be a concern for public health based on the available information. However, because of data gaps and uncertainties, it is possible that future data collection efforts or analyses may identify other HAP of potential concern.

B. *Emissions*

In developing the utility RTC, the EPA examined HAP emissions test data acquired by the DOE,

electric utility companies and organizations, and EPA itself. Further, using section 114 authority, the EPA obtained data from each coal-fired electric utility unit to update and refine the information on mercury emissions from such units. After evaluating various methods to estimate the emissions, the EPA estimates that the industry emitted 43 tons of mercury in 1999 from 1,149 units at 464 coal-fired plants.

The analyses of the data obtained are explained in the utility RTC and in subsequent documentation. Table 1 of this notice presents estimated 1990 and 2010 nationwide HAP emissions from electric utility steam generating units as presented in the utility RTC. The estimates account for projected changes in the population of units, fuel consumption, and control device configurations. Coal- and oil-fired electric utility steam generating units are major sources (as defined in section 112(a)(1) of the CAA) of hydrogen chloride and hydrogen fluoride emissions, emit a significant number of the 188 HAP on the section 112(b) list, and are the leading anthropogenic sources of mercury emissions in the U.S.

TABLE 1.—SELECTED NATIONWIDE ESTIMATED HAP EMISSIONS

HAP	Selected nationwide HAP emissions estimates (tons/year)					
	Coal		Oil		Natural gas	
	1990	2010	1990	2010	1990	2010
Arsenic	61	71	5	3	0.15	0.25
Beryllium	7.1	8.2	0.5	0.4		
Cadmium	3.3	3.8	1.7	0.9		
Chromium	73	87	4.7	2.4		
Dioxins	0.000097	0.000108	2×10^{-6}	3×10^{-6}		
Formaldehyde					36	57
Hydrogen chloride	143,000	165,000	2,860	1,450		
Hydrogen fluoride	19,500	27,500				
Lead	75	87	10.6	5.4		
Manganese	164	219	9.3	4.7		
Mercury	46	60	0.25	0.13		
Nickel			393	198	2.2	3.5

For mercury, it was estimated in the utility RTC that the industry emitted approximately 46 tons in 1990 (51 tons in 1994) and was projected to emit approximately 60 tons in 2010 from 1,026 units at 426 coal-fired plants. The new information obtained under section 114 authority corroborates the emissions estimates. The increase in the number of units over that of the utility RTC results primarily from the identification of additional co-generation facilities meeting the section 112(a)(8) definition. The quality of the 1999 data is considered to be significantly better than that of the data reported in the utility RTC. Specific coal data, including the mercury content, were obtained for each coal-fired unit in the U.S. over the entire year; previously, State-average data were used. In addition, the control performance of existing control devices for each of the three major species of mercury (divalent, elemental, and particulate) were available; for the utility RTC, only total mercury values were available. The new data allowed EPA to significantly refine and improve its analyses and evaluate various methodologies in estimating nationwide mercury emissions from coal-fired electric utility steam generating units.

C. Alternative Control Strategies

Recent data show the technologies used to control criteria pollutants (particulate matter (PM), nitrogen oxides (NO_X) and sulfur dioxide (SO_2)) are effective in controlling emissions of nearly all HAP except mercury. In addition, combinations of controls for criteria pollutants can lead to varying levels of control, and in some cases full control, of mercury emissions. The application of technologies used to

control mercury emissions in conjunction with technologies used to control other pollutants, an approach called multipollutant control, can substantially reduce or offset the costs of HAP control.

Potential strategies for controlling mercury and other HAP emissions include the use of: precombustion controls (*e.g.*, fuel switching, coal switching, coal cleaning); combustion modification methods used to control NO_x emissions; flue gas cleaning technologies that can be used to control emissions of criteria pollutants and HAP; and nontraditional controls such as demand side management and energy conservation.

Conversion of coal- and oil-fired units to natural gas firing effectively eliminates HAP emissions. Although conversion of coal-fired units to oil combustion will decrease emissions of some HAP, including mercury, it could increase emissions of others (especially nickel). Because of the wide variability in the trace metal contents of coals, switching coals generally may not result in consistently reduced HAP emissions. Current methods of coal cleaning remove portions of the trace metals contained within the coal; the average emissions reductions range from approximately 30 percent for mercury to approximately 50 percent for lead.

Nontraditional control methods (*e.g.*, demand side management, energy conservation, pollution prevention) have the potential to result in reduced HAP emissions, but the extent to which that is possible is currently uncertain. The nontraditional controls reduce HAP emissions through the avoided

generation of HAP rather than by their removal from the exhaust gas stream.

Mercury in the flue gas from coal combustion may be present in three different forms. The forms, called species, include elemental mercury, divalent oxidized forms, and mercury adsorbed onto the surface of fly ash or other particles. The capture of mercury is highly dependent on the relative amount of mercury species that are present in the flue gas. Particulate bound mercury can easily be removed in conventional PM emission control devices such as electrostatic precipitators (ESP) and fabric filters (FF). Divalent forms of mercury are generally soluble in water and can be captured in wet scrubbers. Wet flue gas desulfurization (FGD) systems generally capture more than 90 percent of the divalent mercury, which may represent a 20 to 80 percent removal of the total mercury. Elemental mercury is insoluble in water, does not react with alkaline reagents used in FGD systems, and cannot be captured in wet scrubbers. Both the elemental and divalent forms of mercury can be adsorbed onto porous solids (*e.g.*, fly ash, powdered activated carbon, calcium-based acid gas sorbents) for subsequent removal in a PM control device, although elemental mercury is more difficult to adsorb onto solid surfaces than are the divalent forms of mercury. Bituminous coals contain higher concentrations of chlorine and other constituents that promote the oxidation and capture of mercury in conventional air pollution control devices. In contrast, flue gas from the combustion of subbituminous and lignite coals typically have higher amounts of the more difficult to control elemental form of mercury.

The available data indicate that installation of low-NOx burners and other combustion modification methods in pulverized coal-fired units may increase the carbon content of the fly ash. Mercury emissions may then be reduced through adsorption onto the fly ash carbon and subsequent capture in the PM control device. The improved mercury capture may come at the expense of slightly higher emissions of organic HAP. Cyclone-fired units emit low amounts of fly ash and reduce the chances of mercury adsorption and capture as particle-bound mercury. Fluidized bed combustion systems typically have high flue gas concentrations of high carbon-content fly ash and high levels of mercury capture in PM emission control devices.

Electrostatic precipitators and FF generally remove greater than 90 percent of all trace metallic HAP, with the exception of mercury. They are not effective in reducing emissions of gas-phase HAP, which include trace organic HAP and HAP such as hydrogen chloride and hydrogen fluoride.

Mechanical collectors and wet PM scrubbers are not generally effective in reducing HAP emissions. Mechanical collectors capture only HAP that are associated with large particles; fine-particle HAP and gas-phase HAP pass through and are emitted to the atmosphere. Wet PM scrubbers are moderately effective in reducing water-soluble HAP but do not effectively reduce HAP emissions associated with fine particulate or hydrophobic volatile organic HAP.

Dry scrubbers which employ a spray dryer adsorber (SDA) in conjunction with an ESP or FF are typically very effective in reducing HAP emissions. In SDA systems, water containing an acid gas

sorbent is sprayed into a reaction vessel where the acid gases and other pollutants are reacted to form solid particles that can be collected in a downstream PM control device. Some coal-fired utilities that use bituminous coal in pulverized coal-fired units have shown mercury capture in excess of 90 percent in SDA/FF systems.

Wet FGD systems are capable of capturing nearly all HAP other than mercury and more than 90 percent of the divalent and particle bound mercury. Mercury removal in wet FGD systems may range from less than 20 to more then 80 percent, depending on the type of coal and combustion system used. Mercury capture in such units can be improved by the use of catalysts or reagents to increase the conversion of elemental mercury to soluble divalent forms of mercury.

Recent research indicates that mercury removal may be enhanced through the use of oxidizing agents (that convert elemental mercury to the ionized form) or through the use of sorbents (that adsorb the mercury onto solid particles). Enhanced mercury removal may also be achieved through greater use of multipollutant control options. Recent data indicate that the use of selective catalytic or noncatalytic reduction for NOx control may also oxidize mercury and, therefore, enhance mercury control.

Thus, EPA's analysis of potential HAP control strategies allows EPA to conclude that, during the regulatory development process, effective controls for mercury and other HAP can be shown to be feasible.

D. *Conclusions*

The following conclusions summarize those presented in the utility RTC and those based on the information subsequently obtained and are based on the currently available scientific data. The conclusions, as a whole, support a finding that regulation of coal- and oil-fired electric utility steam generating units for HAP is appropriate and necessary.

1. Fossil fuel-fired electric utility steam generating units (coal-and oil-fired units in particular) emit a significant number of the 188 HAP included on the section 112(b) list. Estimated growth in the number of, and fuel use by, electric utility steam generating units (particularly coal-fired units) during the period 1990 to 2010 will result in an overall increase in HAP emissions. The new data gathered to date corroborate the previous nationwide mercury emissions estimate and confirm that electric utility steam generating units are the largest anthropogenic source of mercury in the U.S.

2. Mercury is highly toxic, persistent, and bioaccumulates in the food chain. Mercury emissions are transported through the atmosphere and eventually deposit onto land or water bodies. The deposition can occur locally near the source or at long distances (*e.g.*, hundreds or thousands of miles away). The air transport and deposition patterns of mercury emissions depend on various factors, including: The form of mercury released (divalent mercury deposits nearer to the source whereas elemental mercury enters the global pool and deposits farther from the source); the stack height and meteorology; and chemical transformations during transport in the

atmosphere. Once deposited, the chemical form of mercury can change into methylmercury (through a methylation process), which is a more toxic form that biomagnifies up the aquatic food chain. Fish consumption dominates the pathway for human and wildlife exposure to mercury. There is a plausible link between emissions of mercury from anthropogenic sources (including coal-fired electric utility units) and methylmercury in fish.

3. Neurotoxicity is the health effect of greatest concern with methylmercury exposure. Methylmercury has a relatively long half-life in the human body (averaging about 70 to 80 days). Dietary methylmercury is almost completely absorbed into the blood and distributed to all tissues including the brain; it also readily passes through the placenta to the fetus and fetal brain. The developing fetus is considered most sensitive to the effects from methylmercury; therefore, women of childbearing age are the population of greatest concern. Offspring born of women exposed to relatively high levels of methylmercury during pregnancy have exhibited a variety of developmental neurological abnormalities, including delayed developmental milestones, cerebral palsy, and reduced neurological test scores. Studies suggest that far lower levels of in utero exposures have resulted in delays and deficits in learning abilities. It is also possible that children exposed after birth are also potentially more sensitive to the toxic effects of methylmercury than adults because their nervous systems are still developing.

4. Extrapolating from high-dose exposure incidents, the EPA derived an RfD for methylmercury of 0.1 ug/kg/day based on developmental neurological

effects observed in children born to mothers exposed to methylmercury during their pregnancy. The NAS study determined that EPA's RfD is a scientifically justifiable level for the protection of public health. At the RfD or below, exposures are expected to be safe. The risks following exposures above the RfD are uncertain, but risk increases as exposures to methylmercury increase.

5. The results of recent dietary surveys indicate that most of the U.S. population consumes fish and is exposed to methylmercury as a result. Based on the surveys, about 85 percent of adults in the U.S. consume fish at least once a month, about 40 percent of adults consume fish once a week, and 1 to 2 percent of adults consume fish almost daily.

6. The EPA estimates that about 7 percent of women of childbearing age (*i.e.*, between the ages of 15 and 44 years) are exposed to methylmercury at levels exceeding the RfD and about 1 percent of women have methylmercury exposures 3 to 4 times that level.

7. Exposure to methylmercury can have serious toxicologic effects on wildlife as well as on humans. Adverse effects to avian species and wildlife have been observed in laboratory studies at levels corresponding to fish tissue methylmercury concentrations that are exceeded by a significant percentage of fish sampled in lake surveys. Generally, wildlife consume fish from a much more limited geographic area than do humans which can result in elevated levels of mercury in certain fish-eating species in localized geographic areas. Those species can include kingfisher, river otter, racoon,

loon, as well as some endangered species such as the Florida panther.

8. The EPA predicts that increased mercury deposition will lead to increased levels of methylmercury in fish, and that increased levels in fish will lead to toxicity in fish-eating birds and mammals, including humans. The NAS, in its July 2000 report, stated that "because of the beneficial effects of fish consumption, the long-term goal needs to be a reduction in the concentrations of methylmercury in fish." The EPA agrees with that goal and believes that reducing emissions of mercury from electric utility steam generating units is an important step toward achieving the goal.

9. There are a number of alternative control strategies that are effective in controlling some of the HAP emitted from electric utility steam generating units. Recent data indicate that mercury, perhaps the hardest HAP to remove from the exhaust gas stream, can be effectively removed by using oxidizing agents or sorbents injected into the gas stream. Recent data also indicate the possibility for multipollutant control with other pollutants (*e.g.*, NO_x, SO_2, and PM), greatly reducing mercury control costs.

III. What Is EPA's Regulatory Finding?

Based on the results of the study documented in the utility RTC, as well as subsequent analyses and other available information, the Administrator has concluded that mercury is both a public health concern and a concern in the environment. The Administrator has concluded that there is a plausible link between methylmercury concentrations in fish

and mercury emissions from coal-fired electric utility steam generating units. Although the degree to which that linkage occurs cannot be estimated quantitatively now, the facts are that: There is a linkage between coal consumption and mercury emissions; electric utility steam generating units are the largest domestic source of mercury emissions; and certain segments of the U.S. population (*i.e.*, the developing fetus, subsistence fish-eating populations) are believed to be at potential risk of adverse health effects due to mercury exposures resulting from consumption of contaminated fish. Further, there remain uncertainties regarding the extent of the public health impact from HAP emissions from oil-fired electric utility steam generating units. Those facts and uncertainties lead the Administrator to find that regulation of HAP emissions from coal- and oil-fired electric utility steam generating units under section 112 is appropriate and necessary. It is appropriate to regulate HAP emissions from coal- and oil-fired electric utility steam generating units under section 112 of the CAA because, as documented in the utility RTC and stated above, electric utility steam generating units are the largest domestic source of mercury emissions, and mercury in the environment presents significant hazards to public health and the environment. The NAS study confirms that mercury in the environment presents significant hazards to public health. Further, it is appropriate to regulate HAP emissions from such units because EPA has identified a number of control options which EPA anticipates will effectively reduce HAP emissions from such units. It is necessary to regulate HAP emissions from coal- and oil-fired electric utility steam generating units under section

112 of the CAA because the implementation of other requirements under the CAA will not adequately address the serious public health and environmental hazards arising from such emissions identified in the utility RTC and confirmed by the NAS study, and which section 112 is intended to address. Therefore, the EPA is adding coal- and oil-fired electric utility steam generating units to the list of source categories under section 112(c) of the CAA. As a part of developing a regulation, the effectiveness and costs of controls will be examined along with the level(s) of control that may be technically feasible.

In developing a regulation under section 112(d), the statute authorizes EPA to consider subcategorization of a source category. The emissions standard for existing sources cannot be less stringent than the average emissions limitation achieved by the best performing 12 percent of existing sources in the category or subcategory (the "floor"). However, the EPA intends to develop a record to facilitate consideration of subcategorization of the source category in setting the "floor." Based on the information that EPA has to date, the EPA anticipates that a factual record will allow EPA to propose appropriate subcategories for this source category. In developing standards under section 112(d) to date, the EPA has based subcategorization on considerations such as: the size of a facility; the type of fuel used at the facility; and the plant type. The EPA also may consider other relevant factors such as geographic conditions in establishing subcategories. Once the source category is divided into subcategories, the EPA determines the "floor" for each subcategory and, in turn, the emissions standard independently for each subcategory. This

approach has helped build flexibility in meeting environmental objectives in the past.

Once the floor is determined, the EPA can set an emissions standard that is more stringent than the floor if a tighter level of control is technically achievable and is justified. Factors that must be considered in deciding whether a more stringent standard than the floor is justified include: the cost of a more stringent standard; the energy requirements; and any non-air quality health and environmental factors.

Every source has to meet the level of a standard set under section 112(d), but not necessarily every individual unit at a source. Most electric generating plants have several units and so in meeting the standard there may be opportunity for lower cost solutions because the law allows for differences in reductions among units as long as the source as a whole is in compliance.

There is considerable interest in an approach to mercury regulation for power plants that would incorporate economic incentives such as emissions trading. Such an approach can reduce the cost of pollution controls by allowing for least-cost solutions among a universe of facilities that face different control costs. Trading also can allow for a greater level of control overall because it offers the opportunity for greater efficiency in achieving control. The EPA, however, recognizes and shares concerns about the local impacts of mercury emissions and any regulatory scheme for mercury that incorporates trading or other approaches that involve economic incentives must be constructed in a way that assures that communities near the sources

of emissions are adequately protected. Thus, in developing a standard for utilities, the EPA should consider the legal potential for, and the economic effects of, incorporating a trading regime under section 112 in a manner that protects local populations.

The Administrator finds that regulation of HAP emissions from natural gas-fired electric utility steam generating units is not appropriate or necessary because the impacts due to HAP emissions from such units are negligible based on the results of the study documented in the utility RTC.

The EPA has previously indicated that it construes the term "electric utility steam generating unit," as defined in section 112(a)(8) of the CAA and 40 CFR 63.41, to exclude all stationary combustion turbines, regardless of whether such turbines are used to generate electricity or used by an electric utility, and regardless of whether such turbines are used in conjunction with waste heat recovery units (65 FR 34010). Therefore, the finding concerning natural-gas fired electric utility steam generating units does not apply to stationary combustion turbines.

IV. Is This Action Subject to Judicial Review?

Today's finding that it is appropriate and necessary to regulate coal-and oil-fired electric utility steam generating units adds these units to the list of source categories under section 112(c). Section 112(e)(4) of the CAA states that, notwithstanding section 307 of the CAA, no action of the Administrator listing a source category or subcategory under section 112(c) shall be a final EPA

action subject to judicial review, except that any such action may be reviewed under section 307 when the Administrator issues emissions standards for such pollutant or category. Therefore, today's finding is not subject to judicial review. As specified by section 112(e)(4), judicial review would be available on both the listing decision and the subsequent regulation at the time that such final regulation is promulgated. At such time, the exact dimensions of the source category and the nature of the control required would be sufficiently clear to allow for judicial review.

V. Is EPA Asking for Public Comment?

The EPA has held several public meetings wherein oral and written public input were solicited and obtained regarding the regulatory finding. In addition, numerous opportunities for written comment relating to both the study and the regulatory finding have been provided. The EPA has decided that it is unnecessary to solicit additional public comment on today's finding. The regulation developed subsequent to the finding will be subject to public review and comment.

VI. Administrative Requirements

Today's notice does not impose regulatory requirements or costs. Therefore, the requirements of Executive Order 13045 (Protection of Children from Environmental Health Risks and Safety Risks), Executive Order 13084 (Consultation and Coordination with Indian Tribal Governments), Executive Order 13132 (Federalism), the Regulatory Flexibility Act, the National Technology Transfer and Advancement Act, and the Unfunded Mandates

Reform Act do not apply to today's notice. Also, this notice does not contain any information collection requirements and, therefore, is not subject to the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. This notice was reviewed by the Office of Management and Budget under Executive Order 12866 (58 FR 51735, October 4, 1993).

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APPENDIX J

United States Environmental Protection Agency

Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

EPA-453/R-98-004a

February 1998

Study of Hazardous Air Pollutant Emissions From Electric Utility Steam Generating Units – Final Report to Congress

Volume 1.

[CONTENT OMITTED]

EXECUTIVE SUMMARY

[CONTENT OMITTED]

ES. 2 REGULATORY DETERMINATION

This report does not contain a determination as to whether or not regulations to control HAP emissions from utility units are appropriate and necessary. The Agency has deferred the regulatory determination until a later date.

[CONTENT OMITTED]

ES. 16 OVERALL TECHNICAL SUMMARY AND CONCLUSIONS

Based on available information and current analyses, the EPA believes that mercury from coal-fired utilities is the HAP of greatest potential concern and merits additional research and monitoring. There are uncertainties regarding the extent of risks due to mercury exposures including those from utility emissions. Further research and evaluation are needed to gain a better understanding of the risks and impacts of utility mercury emissions. In addition, further research and evaluation of potential control technologies and strategies for mercury are needed.

For a few other HAPs, there also are still some remaining potential concerns and uncertainties that may need further study. First, the screening multipathway assessments for dioxins and arsenic suggest that these two HAPs are of potential concern (primarily from coal-fired plants); however, further evaluations and review are needed to better characterize the impacts of dioxins and arsenic emissions from utilities. Second, nickel emissions from oil-fired utilities are of potential concern, but significant uncertainties still exist with regards to the nickel forms emitted from utilities and the health effects of those various forms. The impacts due to HAP emissions from gas-fired utilities are negligible based on the results of this study; therefore, the EPA feels that there is no need for further evaluation of the risks of HAP emissions from natural gas-fired utilities

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